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THE BOSTON MUDDLE.

The situation at Boston in regard to gas affairs becomes apparently more muddled day by day, and it is almost impossible to give, within limits of the space at our command, a reasonably clear insight into the present standing of the situation. In our editorial comment on the subject in issue of December 2d, it is stated that "Mayor Martin had returned with his veto the ordinance passed at aldermanic meeting of Monday, Nov. 17 (incorrectly stated in the JOURNAL as having been held on Nov. 18), giving permission to the representatives of the Consumers' Gas Company to open the streets of Boston, etc.—the veto message having been handed in at Board meeting of November 25." The ordinance as passed contained the usual amount of legal verbiage regarding the strict methods in which the main laying operations were to be conducted, plenty of assurance being given (as far as words were concerned) that no existing water or gas mains or sewer conduits would be unnecessarily disturbed, the highly important provision also being added that the company should not, in the course of the work, "use the fire hydrants nor the water therefrom without a permit from the proper authorities." While so particularly anxious to assure the municipal authorities that no water would in any event be purloined, and extremely solicitous to advance the idea that no interference would be made with other underground conduits, the framers of the measure were also thoughtful enough to add that all this work should be under "authority and supervision of the Superintendent of Streets," but remained strangely silent on the important point of who was to reimburse the city in the cost of such "supervision and inspection." In their zeal for the public good the "benefactors and careful builders" also forgot to say anything about binding themselves in any forfeitable sum of money in case their operations might result to the detriment of the city; and this omission did not seem to them anything like out of the way—although we understand that even when telegraph or telephone companies desire to lay underground cables through the streets of Boston, their representatives are required to file bonds never going below the sum of $20,000. So far, though, these promises are about identical with those made in the original proposition that was rejected on September 29th; but the proposed new "deal" did include some additional guarantees and privileges (?) to the municipal authorities, the substance of same being as follows: The city of Boston should have the right, within one year after Jan. 1st, 1915, to acquire and purchase the entire plant of the Consumers Company, paying therefor a sum to be awarded by three referees (provision being made as to appointment of referees), but said award should not be less than the cost of said plant and structures, as shown by the books of the company, with interest upon said cost at the rate of six per cent. per annum. The last "provision" was that the rights acquired under this order "shall never be sold, conveyed, or assigned to the Boston Gas Light Company."

We must beg leave to submit that all these "important and valuable" considerations certainly had due weight in changing the opinions entertained by the members of the Board of Aldermen; and while we were under the necessity of acknowledging the change made, and were guilty of expressing our astonishment thereat in the columns of the JOURNAL, being moved thereto on simply receiving a telegram from Boston announcing the strange reversal of feeling, we must now confess that this feeling of astonishment had been converted to one of utter amazement when the bare facts in the case, as shown by a perusal of the minutes of the Board of Aldermen, came to hand. We do not believe that a more complete case of doltish stultifica-

tion has ever before been presented by the official action of any municipal body in the United States. Such a proceeding might have been excusable to a certain extent if perpetrated in the Black Hills mining country; but to think that Boston, of all places, should furnish the example!

The frigidity of the Consumers' manipulators in the "guarantees" given almost assumes the proportions of a mammoth iceberg; still, those who know them best, and have traced out their operations in other cities, will not be disposed to wonder greatly at anything they might do in following out their peculiar business methods. The arrangement for disposing of the plant to the city of Boston some thirty years from now, and the terms under which that transfer is to be effected, is such ridiculous bosh that comment on it here is useless, as indeed is also reference to the promise, or pledge, that the rights gained under the ordinance would never be sold, conveyed, or assigned to the Boston Gas Light Company. There might be one thing which they omitted to do (but which had they so done would still have been perfectly natural on their part), and that neglected item was to offer a separate "provision" to the effect that if the city did not want to purchase the valuable rights, structures, etc., in the year 1916 or thereabouts (we wonder where Frost & Co. will be at that period), the Boston Gas Light Company might step in and take the municipality's place. Perhaps they did not want to enrich the present value of the Boston Company's stock, seeing that it is at a pretty high figure now; but only Messrs. Frost & Co., can give the reasons, and we guess they may be safely left in their tender care.

Mayor A. P. Martin, however, in his veto message rather riddled the "provisions" in short order; exposed their ridiculousness in terse terms; and conveyed a sort of mild reproof to the City Fathers on their seeming eccentricity of action. The Consumers folks, in the interim of Nov. 17 and 20, were rather suspicious that Mayor Martin would hinder their schemes, and a great "still hunt" was made among the legal talent in the effort to convince themselves the Mayor had no veto power over the question. So far had they deluded themselves in this direction that Jas. R. Osgood, President of the Consumers Company, handed in a written communication to the Board at meeting of Nov. 24, in which it was in substance stated that the Company had been informed by the City Clerk that consent required by law had been granted "said Company to dig up and open streets," etc., and said Company "accepts, assumes, and will perform the burdens imposed upon it by the *Mayor* and Aldermen in giving such consent." The starch in their compositions remained stiff to the end; and the impudence of the communication will be understood when it is recalled to mind that it bore date of Nov. 20, or just four days before the Mayor's veto was handed in and read. It must have been rather confusing to them to hear that veto read, and immediately afterward listen to their own acceptance of the "burdensome conditions imposed" upon them by the *Mayor* and Aldermen. Alderman McDonald moved that the veto message be laid upon the table, and Ald. Curtis performed a like service on behalf of President Osgood's well-founded (?) letter of acceptance, both motions receiving affirmative assent.

At the next meeting of the Board (that of Dec. 1), Ald. Hersey moved to take the veto message from the table, with a view to its final disposition—and be it remembered that Ald. Hersey is one of the three Aldermen who adhered to negative action on the ordinance during the previous sessions. Ald. McDonald objected, on the ground that he had not seen the message in print, and was desirous of having more time granted in which to consider the matter. After listening to this argument Ald. Hersey withdrew his motion, and the matter again went over.

The next move was but another step taken toward adding to the mire composing the substance of the muddle. When the regular order of business in Board had gotten to a certain length, the conservative Alderman rejoicing in the name of Leighton offered a petition praying that permission be accorded a concern known to fame, and in the index of the order, as the "Bay State Gas Company," to lay pipes for the transmission of illuminating gas underneath the surface of the streets, etc. The projectors offered to file a bond in the sum of $100,000 for the protection of the city's rights, and so on. Here was another complication, i², as supposed by us now, the Bay State Company is in direct conflict with the Consumers' objects and plans. We all know that there are "wreckers and wreckers," such duplication sometimes being also observed in the provisions of Nature, as recorded by the observing individual who long ago declared that "fleas have other fleas to bite 'em," etc. This may be a case of that kind; and from present knowledge we are rather inclined to accede to its truth. The Board, however, declined to consider the matter at the session witnessing its introduction; but ordered the measure to be printed and laid over for consideration by the full Board. That course ended the case so far as the meeting of Dec. 1st was concerned.

At the session of Dec. 8th, with true and characteristic eccentricity of action, only colored this time with a strong tint of cowardice, a motion was made by Ald. McDonald to have the consideration of the Bay State Company's application referred to the tender (or otherwise) mercies of the Board of Aldermen to be chosen at the municipal election to take place on Tuesday last. [The members of the new Board, we believe, take their seats on the 1st of January, 1885.] The motion was carried; and so the matter stands with regard to the Bay State proposition. No reference whatever was made to the veto of Mayor Martin at the meeting of the 8th, and as our forms go to press on the afternoon of Dec. 15th, we are consequently unable to state in this issue what will have transpired at the Aldermanic meeting of that date.

THE AMERICAN INSTITUTE FAIR.

It is particularly gratifying to be called upon to state that the Fifty-third Annual Exhibition given by the American Institute, at its building on Third avenue, in New York city, was the most successful one ever held. This is assuring testimony of the agreeable fact that our people at large are becoming more interested in mechanical progress, and are desirous of educating themselves in some degree in the details of matters that were formerly looked upon as affording but a slight amount of interest. All this, of course, is pleasurable to one's feeling of national pride, for a nation peopled with close observers must of necessity be also a country advancing along the line of true progress—although we must confess that a little more attention directed to the study of questions involved in gas polity would not be in the nature of misdirected observation. And before saying anything in regard to the gas exhibits at the recent display of the Institute (the Fair closed on Saturday, December 6th) we think attention should be called to the building which has hitherto fairly well answered the purposes to which it was devoted. The structure is no longer sufficient to accommodate the vast throngs that assemble within its walls, and we hope that steps may speedily be taken by the managers to erect an edifice worthy of the advancing scope and aims of the Institute.

The gas exhibits of this season's display were perhaps not numerically as strong as those of last year, but those in position were admirably arranged and attended to. Now we know that it is hardly the thing to make any direct comparisons, and we will refrain from doing so; but cannot forbear giving an opinion as to the order of merit as such order appeared to exist. First, in variety of exhibit and completeness of management, comes the American Meter Company. This exhibit comprised a neatly arranged selection of gas cookers, heaters, water boilers, soldering iron heaters—in fact, a score or more different appliances all intended to show in how many ways gas could be employed both as a domestic agent and as a useful adjunct to commercial trade purposes. A corps of polite and spry attendants were kept constantly employed in explaining the purport of the different articles to the questioning visitors; but the most distinctive feature, and also the one most attractive to the feminine inquisitor, of this exhibit was in the fact that a "No. IX, closed top range" was constantly doing active duty under the guidance of a trained cook. On Tuesday afternoon of Dec. 2 a few specially invited guests partook of a collation, the eatables whereof were prepared on the "No IX" range. Among the guests were noticed General Charles Roome and wife. The Goodwin Gas Stove and Meter Company's exhibit ranked next in importance. They displayed a full line of their improved appliances—the most striking feature of the exhibit being an elegant open fireplace grate. It was really a splendid specimen of mechanical art. It seemed to us, though, that the Goodwin folks' idea was to give especial prominence to an exhibition of the Clerk gas engine. A handsome, well-built specimen of this motor (classed as eight-horse power) was kept in constant working, with an engineer always at its side ready to impart information concerning it. The Sheldon Gas Stove Company displayed some ten or a dozen specimens of their ranges, etc. The Wilbraham Brothers, of Philadelphia, Pa., had on exhibition two of the Baker Pressure Blowers, one large and one small. The large blower (catalogued as No. 5½) when speeded at the rate of 125 revolutions per minute, was calculated to furnish blast for 50 smiths' fires. They also exhibited one of their gas exhausters capable of passing 175,000 cubic feet in 24 hours; also a specimen of their rotary piston pump. One of the Messrs. Wilbraham was in charge of affairs, and the gentleman informed us that they had recently put in a large exhauster in the works of the Northern Liberties Gas Light Co., of Philadelphia, Pa. It seemed to be the general verdict that the United States incandescent lights (partially employed in illuminating the side aisles) were more reliable than those used last year, although even on three separate occasions this season (the interruption happening at decidedly awkward times) there had occurred entire extinguishment. The gas, however, stood ready to fill in the gap.

Books Received.

We desire herewith to acknowledge the courtesy of Mr. W. H. Bennett, Secretary of the Gas Institute, in sending us a handsomely bound volume of the Transactions of the Institute for 1884. The same mail also brought from the same source bound copies of the Report on the Gas Section of the International Electric and Gas Exhibition, held at Crystal Palace, London, in 1882-3, made by the Committee appointed by the Gas Institute to take charge of the work. The volumes contain much important information, and are especially valuable as works of reference.

[Official Report.—Continued from page 288.]

Twelfth Annual Meeting of the American Gas Light Association.

Held at Willard's Hall, Washington, D. C., Oct. 15, 16, and 17.

Second Day, Morning Session—Thursday, Oct. 16.

The Association was called to order at ten o'clock on the morning of the second day by President Stedman, who congratulated the members on the continuance of the exceedingly pleasant atmospheric conditions. The prevalence of fair weather was especially pleasing, as part of the day's business was to include a visit to the White House, etc. The President then announced that the first thing in order would be the reading of papers. In accordance with this notification Mr. S. G. Stiness, of Pawtucket, R. I., thereupon read the following paper, entitled

A POSITIVE CURE FOR CHOKED STAND PIPES.

Gentlemen of the Association:—Among the many questions which have pressed themselves upon the attention of the practical gas manager there is none, I think, of more importance than the subject of choked stand pipes—these nuisances presenting themselves, as they do, in season and out of season, and as a rule making their appearance most often at a season when we would be most pleased to be relieved of their presence, to the end that we might have our minds freed from a burden of anxious and vexatious care, and the muscles of our firemen saved from the strain of an extra and severe duty. All the ingenuities of active and earnest minds have been engaged for many a year in the attempt to solve this perplexing problem; and I may add that frequently, when I have been permitted to witness the operation of relieving a choked stand pipe, I have given expression to the thought that the freeing process was accompanied by language not in strict accordance with one's idea of a "proper line of prayer."

When our worthy Secretary first requested from me a paper on "a cure for choked stand pipes," I readily acquiesced in the suggestion, being all the more readily led thereto from the fact that I had been engaged in experimenting in that direction for several months, and happily with the most gratifying results. But when the printed notice of the Secretary came to hand I found that our friend had made an important addition to the subject as originally proposed, and the word "positive" had been added. Now as I am rather partial to such a word as "positive," I must confess that I was not displeased at the addition, and particularly so as I am fully convinced that my experiments were in the right direction, and that if systematically carried out by others in their particular cases will prove a "Positive Cure for Choked Stand Pipes."

Early in September of 1883 I commenced carbonizing coal, in the ordinary operation of gas making, in a new bench of retorts fitted as follows: Arches, 7 ft. 6 in.; retorts, 14 in. by 26 in. by 9 ft.; all ascension, bridge, and dip pipes, 7 in.; hydraulic main, 24 in.; seal on hydraulic main of 1½ in.; retorts heated by the Dieterich furnace system. Everything worked along in the most perfect and excellent manner until early in the following month, when, for the first time in all my experience of gas making, the perfect bliss of choked stand pipes was made known to me, "as part of the inheritance our fathers did bequeath us." To say that they were choked is to draw it mild—had the "Salvation Army" been within hail their services would immediately have been secured. I determined, if possible, to find the cause and prevent its continuance. In our examination of the matter we found that the hottest retorts were those in which the stoppages were most constant and persistent, and that next in order came some of the lower ones, where the ascension pipes were rough and not carefully cleaned, the cleansing operation being rendered all the more difficult on account of the readiness with which the tar or pitch adhered to them. We first tried a thorough cleaning of the pipes and mains, continuing on in that line for some time, and, of course, with good results. While the trouble was somewhat abated, still the cure was not *positive*. The next experiment was to remove the stand, bridge, and dip pipes, and these, with the hydraulic main, were all thoroughly cleaned out and made as good as new. After that for some time all went well. A recurrence of the stoppages prompted us to make an examination of the hydraulic main, and we found, under each dip pipe, a mound of what, by a stretch of imagination, might be called tar, but what I think was a dry, fine carbon, mixed with another substance, the two together making such a thick conglomerate muck that I had no desire to continue my examination any further in that direction. I then had the main cleaned out again, and determined to ascertain if this carbon, or soot, and pitch was caused by the high heat at upper retort, and accordingly placed in two dip pipes a cup fitted so loosely as to be easily drawn out. I soon found that the high heat caused nearly all the deposit of dry material, and the lesser heat gave the more pitch. I continued the experiment many times, and found that while the other pipes rarely stopped, the one where the resistance was would stop after the second charge. I was then fully convinced that I had discovered the cause in that the heat of the retort was the chief sinner. Having found the cause, the next step was to find the "cure positive for choked stand pipes."

Many inventions had been tried, and among these one put forward by a member of the British Association of Gas Managers. This gentleman claimed that by placing a guard at the mouth of the retort he prevented this deposit, and in his paper on the subject said: "The higher we get the heats in the retort, the more cessible become the particles of disintegrated carbon and other dry substances which are constantly being made and drop from the inside of the retort." And this is undoubtedly true, as in passing over these particles must be deposited directly under the dip pipe, causing increased pressure on the retort, and finally ending in choked stand pipes. As we are not informed of the universal adoption of the plan as suggested by the English engineer, I fear that it lacked the one essential element—and that element the one expressed by the word added by our Secretary to the original question.

As misery likes company, I visited the works of the Providence (R. I.) Gas Company (believing that they were in possession of a *limited* portion of the inheritance so generously bestowed on others), to talk of my hopes, trials, and almost despair; but nevertheless, fully believing that I was traveling in the right direction, in the construction of a hydraulic main in which all the heavy products of distillation would, by the laws of nature, be carried to the outlet, to be removed therefrom by the aid of any of the common means now employed.

While discussing the matter with Mr. Hutchison (Supt. of the West Station) he described to me a plan which he wished me to try. Believing that it would answer all the requirements in the case, as demonstrated by my experiments, and having the further advantage that it could be applied to any form of main now in use, I immediately commenced to put the apparatus [here the speaker referred to the drawings] in position. Its function is to remove all the tar from hydraulic main, leaving nothing for the gas to pass through in the main save water. From the time of putting up this crude apparatus (in the way of experiment) choked stand pipes are only known from the same cause that prompts nature to inflict punishment on mankind.

And now, gentlemen, I feel I can claim that by the adoption of a hydraulic main (an illustration* of which is presented with this paper, and of which it forms a part; and further that there is no "patent" on it—if there were I should not be here to present it) in which the tar deposited must flow to the outlet placed on bottom (if the tar be too thick to flow easily means can readily be taken to accelerate its passage) choked stand pipes will be a thing of the past; and the gas being allowed to pass through water only, less resistance will be encountered resulting in the reduction of pressure on retorts.

The application of the apparatus devised by Mr. Hutchison can be made to any main now in use. If a new main is to be erected on an incline, as per the plan presented in drawing, it will be perfectly automatic in its action and positive in its results.

If, after a careful examination of this subject, there should linger a doubt in the mind of any of my hearers that the problem is not yet solved, the matter is of importance, the field is broad, the gate is open, and the reward will be munificent—as the thanks of the gas fraternity will be generously bestowed upon him who truly solves the problem of "a positive cure for choked stand pipes."

On motion of Mr. Pratt, the thanks of the Association were tendered to Mr. Stiness.

Discussion.

Mr. Stiness—Before entering into the discussion with regard to the plan which I have here presented, I wish to say that the hydraulic main is made upon an incline of three inches in each section, and, by the natural laws of gravitation, all of the tar must pass to the bottom of the main, and carried off by any form of tar gate which you may happen to have, or, in any case, can be easily obtained. The application of the box (or Hutchison device) can be made to any common main now in use. In the drawings which I have presented the tar is taken from the side of tar gate; but the particular place where the tar is taken from is of no material consequence. If the opening of the hydraulic main on under side be not convenient, it can be taken from the upper side. The apparatus which is herewith presented is not perfectly automatic in its working. This box is five feet long, twelve inches deep, and four feet high. Any desirable dimension of box can be made which will fit between the buck-staves on the bench of the retorts. The increased capacity of box increases the quantity of tar which it will contain, and also lessens the time of emptying the thick tar which will be deposited therein. The displaced water flows back to the hydraulic main, thus keeping your seal always at the same point. Your tar gate remains the same. In case the tar is not drawn off as soon as the box becomes full, it flows over, taking its usual course to the drip of tar well. The size of box is immaterial; but the larger you have it the fewer times you will be obliged to open and close it. There is no outlet for any gas, the box being really a wrought iron tank. When the box becomes filled (the tar settling at the

* See Journal, Vol. 40, No. 6—issue of March 17, 1884.

bottom) of course, the water will flow back into the main. The point of advantage which I claim, and which I think the gentlemen will willingly admit, is that in the first distillation of the coal when working at extremely high heats, particles of carbon are carried over with the gas, and the resistance formed by the thick tarry deposit is certainly greater than that offered by water. When the gas is passing through the tar the resistance is so great that the dry carbon deposits itself in the stand pipe at the hottest point, thereby choking the stand pipe. Then the tar is carried over and deposited in the hydraulic main directly under the dip pipe, there forming a mound of thick tar, dry carbon and other materials. The apparatus which I first put up in my works was simply an old tar barrel, with a two-inch hole bored into it, provided with an outlet by which the tar was drawn off, and the very moment the thick tar ceased running and the water made its appearance, we closed that part and opened the other. This operation would not require to be done oftener than once or twice a day, other than in extremely large works. In my own works we now perform it only once a day; we find that to be sufficient. With the inclined main and the addition of the Hutchison apparatus I claim that the entire tarry content of the hydraulic main can be displaced, leaving nothing to obstruct the passage of the gas save the necessary contact with water.

The President—A general discussion of this paper by Mr. Stiness is now in order. I think that there are many members of the Association who have not yet gotten over the difficulty of stopped stand pipes attendant upon the running of very high heats.

Mr. A. B. Slater—In Mr. Stiness' description of the tar box he failed to make clear one point in reference to the water in the box. Unless I misunderstood him he did not state that the box is to be filled with water to start with, but that as the tar came from the hydraulic main the water was displaced by the tar flowing into it.

Mr. Stiness—I did not state that in my paper, for I supposed it was matter which would be drawn out in the course of the discussion. In placing the box upon an ordinary main, of course, it must be filled with water up to the level of the hydraulic, so that you would not in any case unseal the main. After the box has been once filled, then each time the thick tar is drawn off the box must be refilled with water. In placing the apparatus on an inclined main, after the box is once filled it is perfectly automatic in its arrangement, and will not require to be filled again, because the overflow from the water is passing into it at the same time that it is passing out from the hydraulic seal.

Mr. J. M. Starr—In the fore part of the paper you spoke of having an inch and a quarter seal when you started working with the apparatus. What seal do you carry now?

Mr. Stiness—Just exactly the same. In no case has it been changed.

Mr. Starr—Is not that rather too large a seal to carry? We carry three-eighths of an inch, and consequently have very little back pressure. A result of this may be that we are so little troubled with stopped stand pipes.

Mr. Stiness—I use dip pipe valves upon my main. Immediately upon charging we raise the valves, and therefore we carry a little heavier seal for the short time in which the valves are not in use than we would if we were to carry a continuous sealed main. When the tar gate was first placed upon the main it was located somewhat higher than we intended to have it, and we found by actual experiment that instead of a three-quarter inch seal, as we had proposed to work at, we had an inch and a quarter seal. In my judgment that was an error on the part of the machinist. Even with the valves we found that this heavy deposit of carbon would eventually choke up the hydraulic. We found that especially true, as we were running under pretty high heats. Our daily average yield per retort was a high one; but to be specific, for the year ending October 1st, 1884, the per diem yield per retort, without counting any missed charges, nor taking note of stoppages arising from the many causes which are so well known to gas men—on which occasions the retorts lie idle a great deal—averaged over nine thousand cubic feet.

Mr. Starr—I infer then that you do not have any seal at all; or, rather, only while you are charging.

Mr. Stiness—Only while we are charging.

Mr. Starr—May that account for your not now having any stopped stand pipes?

Mr. Stiness—We had stopped stand pipes even from the first. The valves were placed upon the hydraulic main when the works were built. The works are entirely new, and everything about the plant was new. We found in the upper retorts, which were decidedly the hottest, that this accumulation of thick tar was directly under the dip pipe, and sometimes was so great as to fill the dip pipe up beyond the opening of the valve itself when it was raised. We took the under plates off from the hydraulic main several times during the winter, stopping the entire works to accomplish this result. In the experiment which I spoke of—that of placing the tin cup in the dip pipe—we found that the dry carbon deposited itself directly in the cups when so placed. The cups were pierced for the flow of the gas, and in the dip pipes in which they were placed that deposit was made even at the very outlet of the dip. With the lower retorts, even where we decomposed the oil for enriching, we found but very little deposit directly under the dip pipe. This apparatus has now been in use for over eight months, and we have never changed the plan of working it during that time. We know from repeated taking off the hand plates, and from taking out the plugs on top of the dip pipe, that we have no thick tar nor any accumulation in the bottom of the main sufficient to amount to anything. Its presence could be easily ascertained by taking out the plug of the dip pipe and running a bar down through it.

Mr. W. R. Beal—Having worked a great deal to prevent stopped stand pipes, I trust that I may be pardoned for giving my experience on this subject. Ten or twelve years ago I was in the habit of making eight to nine thousand feet to the retort, per day. I think that any one who has had a similar experience or anything like it, has had all the difficulty that Mr. Stiness refers to, and perhaps more; but it is very queer that my next door neighbor, who has been making (with but a single bench) this summer 55,000 feet to a bench of sixes—and not large retorts at that—has had no trouble at all in his main; the most of you who have approached anywhere near such a record have had a great deal of difficulty, not only with stopped stand pipes, but also with stopped mains. I have said that my experience with stopped stand pipes and stopped mains has led me to do a good deal of hard work in wrestling with the whole subject. I cannot agree with what Mr. Stiness has said about the best form for the hydraulic main. There is no question but that the main which he describes affords a sort of relief so far as stopped stand pipes are concerned. I am now, and have for many years, been using a main which is calculated to alleviate this difficulty. This main may be cleaned out at any time without stopping the make of gas. It has an overflow from the bottom by a four-inch pipe; and this main can not only be cleaned out, but can be drained fairly well. In our experience, however, we do not find that any system of drainage can be depended upon. We find that as we manufacture gas the pitch and the heavy tar (and by heavy tar I mean that which will not run) is formed, and that it stays where it is formed, and has to be forcibly removed. No coaxing that we have been able to effect will induce it to run out. As I have said, we have a four-inch pipe to drain the bottom of the main, and although that facilitates getting the tar out, I do not think very much of it. But as for a main that may be cleaned out at any time, and without any danger, there is no question about its being a valuable apparatus for a gas works, and a preventive for stopped stand pipes.

Mr. M. S. Greenough—I agree very thoroughly with what has been said by the gentleman who has just taken his seat. We have at our works recently conducted a series of experiments, with a variety of regenerator furnaces, some of them of our own device, and some that we have imported from the other side. We have been "enjoying" all the disadvantages of stopped stand pipes, and know just what they mean. We appreciate all the difficulties to which Mr. Stiness has so touchingly alluded. We have come to the conclusion that in order to work regenerator furnaces satisfactorily it is necessary to be able to get into the main. I do not think it will be possible to induce the pitch—which will sometimes result from very great heats, and which heats you will occasionally get from working regenerator furnaces—or lampblack to run off. The worst difficulty we have experienced has been the stopping of the dip pipe with lampblack; and the only way to get that out is to let it run down into the main—allowing it to go off into the tar well, with the effect of stopping that up solidly. We have had to let down twice in order to clear out the main. Some years ago some friends and myself had the pleasure of visiting the gas works at Dresden, and saw the regenerator furnace system in use there. The engineer there at that time showed us a hydraulic main which he had devised for effecting the purpose now under consideration. He had a piece of iron plate which came down from the top of the main, partitioning off the back part from the part in which the dip pipe is sealed. It was so arranged that, without stopping the works, he could take off the plate from back of main, and so remove any pitch which might have accumulated under the dip pipes. It was from seeing the satisfactory results of his plan that we set ourselves at work to devise the hydraulic main we now have in use, and which we thought would be a little better in detail than his. I am inclined to think that the annoyance of stand pipes stopped by pitch can be entirely obviated; but I do not think that anything can prevent the stopping of your stand pipes with lampblack, when your retorts are run at too high a temperature. I do not think that the question of stopped stand pipes has been altogether solved as yet. I have seen more retorts stopped with pitch at a somewhat low temperature than have been stopped with lampblack at a high temperature. To devise an equitable temperature, and to determine exactly the weight of charge with which a large retort can be worked, without stopping the pipes with either pitch or lampblack, is a problem which I do not think has been solved as yet. I shall be very glad to learn how to do it.

Mr. Stiness—I would like to ask Mr. Greenough the question—knowing of the experiments he has been making in that direction—if a main were constructed upon an incline sufficient to permit of the automatic removal of a certain portion of the thick carbon matter, thus leaving nothing but water for the gas to pass through, would not that be a step in the direction of removing the cause of stopped stand pipes?

Mr. Greenough—I have no doubt about it at all. I think that the largest proportion of difficulties from stopped stand pipes arises from excess of pressure, and that the removal of the heavy tar would have a most beneficial tendency. It seems to me that the scheme of an inclined main is not altogether practicable. If you are going to run a setting of eight benches of retorts together for any length of time, it might be difficult to draw all your tar off upon an incline.

Mr. Stiness—It might be allowed to run both ways form the center, could it not?

Mr. Greenough—That might possibly be done. On the benches that I have been experimenting with we have been running off the thick tar from the bottom of main as best we could; but still we could not run it all off by any possibility. I do not think we can solve our difficulties until we are able in some way to clean out the main thoroughly.

Mr. M. N. Diall—I have seen a main having a secondary chamber to the one in which the dip pipes are; and the cleansing chambers were cut down so that this thick tar (oftentimes so thick that it cannot be removed from the top of the hydraulic by the use of even very ingenious tools), could be very easily taken hold of at the bottom.

Mr. A. E. Boardman—I think that Mr. Stiness has struck at one great difficulty—the difficulty of stopped stand pipes. I do not wish to seem egotistical, but I take great pride in saying that I operate probably the smallest works in this country in which a regenerator furnace is in use. It is a works running but two benches of sixes; and I have had the same difficulty (which the gentlemen speak of) in regard to stopped stand pipes. I believe with Mr. Stiness that a great deal of the difficulty is caused by this heavy tar getting under the dip pipes; but I differ with him in believing that a main, even with three inches dip through a length of one section, is sufficient to carry off that heavy deposit. I agree with Mr. Greenough in thinking you cannot get that deposit to run excepting on a very steep incline; because, with my two benches, emptying the tar from both ends and from the bottom, I am unable to keep free my center dip pipes. They will stop up; and the tar will not run off without being moved by some extraneous force. I have just gotten up a main that embodies an inclined plane with a very steep angle (one of about 45°) from the front of the main towards the back, bringing the dip pipe in at the side, where it can be easily reached from the top of stand pipe, and this heavy stuff can be shoved back into the main, and from there taken out in the manner described by the gentlemen who have just spoken. I do not think that Mr. Stiness has reached the cure for the evil entirely, even though the incline would allow all the heavy tar to run out of the main. After cleansing my main thoroughly I had stopped stand pipes again occur within two days, and before it was possible to have accumulated enough tar to stop up the dip pipe. These stoppages seemed to be owing entirely to lampblack. I think the heavy tar stoppages, which frequently occur in the cross saddle pipe, are caused by this accumulation; and I do not know of any means yet discovered which will keep the stand pipes from becoming stopped by a deposit of lampblack. I have taken out my stand pipes, and have substituted clean ones in place of them when I did not have time to clean out those so removed, but they would stop within two days, even when I knew that the main had been cleaned out only a few days previously, and when the tar was running through the main as fluidly as could be.

AN INVITATION TO VISIT THE PATENT OFFICE.

The President—I have the pleasure of announcing to you that we are honored this morning with a visit from Major Dyrenforth, of the Patent Office, who is especially interested in gas matters, and I am very glad to welcome him to our meeting. Allow me to introduce him.

Major Dyrenforth—I thank you Mr. President and gentlemen for your greeting; and I would like to extend to you all an invitation to visit the Patent Office before you leave the city of Washington. Although the department offices are now undergoing some repairs, and everything that might be of interest to you is possibly not accessible, yet you may be able to see many things which would repay you for the visit. I will do everything in my power to show you whatever there may be worth seeing.

The President—On behalf of the Association I accept the invitation with very great pleasure. We may not be able to visit the patent office in a body, as it might embarrass you to have all of us come at once; but I suppose that the invitation is extended to the individual members as well as to the Association as a body, and that those of us that may have an opportunity to accept the invitation may visit the Patent Office?

Major Dyrenforth—Certainly. You can come singly, or by twos, or by threes, or in whatever style as may be most convenient.

The President—If there is nothing more to be said on the subject treated of in the paper of Mr. Stiness, we will pass to the consideration of the next subject.

Mr. C. H. Nettleton, of Birmingham, Conn., then read the following paper on

THE PERIODICAL TESTING OF CONSUMERS' METERS.

During the past summer all the meters belonging to the Derby Gas Company, with which the writer is connected, were carefully tested; and, in the hope that a statement of the results obtained and the methods followed may be of some interest and usefulness, this paper has been prepared.

I presume it is so nearly an axiom with a gas manager that it is a good thing to test meters periodically, that no words of mine are needed either to prove it or to enforce it with the members of this Association; but as this paper will probably be published with the proceedings of this meeting, it is perhaps both proper and politic to state the grounds we stand on in relation to this matter.

It is always well for a manufacturer to know that his machinery is in good order and working properly; and in the case of the gas meter, standing as it does between the seller and the purchaser, and determining not only what the one shall charge, but also what the other shall pay, it becomes doubly important that this particular piece of machinery should be carefully watched. Besides, there is a moral responsibility which most of us feel the weight of. Practically, consumers know nothing of meters; which is a very much to be regretted fact, for if they were "known and read of all men," are we not all convinced that the great bone of contention, the great cause of difference between gas company and gas consumer, would be done away with? Unfortunately this is not the case, and when a bill is presented the consumer pays it generally on the ground that it is about the proper amount for the season of the year, or is about the same as last year's bill; or else scolds because it does not comply with the above conditions. But he does not pay it from any knowledge that the number of feet charged has been properly measured, and his belief in many instances is to the contrary. Under this state of affairs we owe it to ourselves, as honest men, as well as to our customers, to know that our meters register correctly.

If we are to know that fact our meters must be tested; and if they are to be tested, how frequently shall it be done? Certainly not every month, nor once in three or six months, nor, in the judgment of the writer, every year. Possibly because almost all the gentlemen who have publicly called attention to this subject have recommended three years—certainly because that length of time commended itself to the judgment of the writer—he has followed in their footsteps, and tested those under his control for the second time during the past summer, the first testing being made in 1881.

From the results obtained the conclusion may fairly be drawn that the time is not too long, as most of the meters were correct, or nearly so; and yet it would seem that a meter ought not to run for a longer period than three years without the manager knowing positively whether it was registering correctly or not.

In order to bring out certain facts, and for the purpose of making a comparison, the results of the testings of both '81 and '84 are given:

	Testing of 1881. Av. Age of Meters, 5.84 Years.				Testing of 1884. Av. Age of Meters, 7 Years.		
	Correct.	Fast.	Slow.		Correct.	Fast.	Slow.
Less than 1 per cent....	47	—	—		76	—	—
1 to 2 per cent.....		116	130			150	146
2 to 5 "		34	53			60	81
5 to 7 "		1	7			8	7
7 to 9 "		1	1			1	3
9 to 12 "		2	1			—	—
Would not register				2			
	47	154	192	2	76	219	237

	1881.	1884.
Total number tested	395	532
New bellows put in.....	45	68
Condemned.....	4	—
Total cost..	$675.00	$816.00
Cost per meter.....	$1.71	$1.53

The above does not include the meters on hand, but only those in actual use. In will be noticed that in both cases the larger number of meters run slow. Exactly, the testing of '81 shows the average of all the meters to be 0.06 of one per cent. slow, and that of '84, 0.03 of one per cent. slow.

Expressed in percentages, the above table gives—

	Testing of '81.	Testing of '84.
Percentage correct.....	11.9	14.3
Percentage varying from 1 to 2 per cent....	62.3	55.6
" " " 2 to 5 "	22.0	26.5
" " " 5 to 7 "	2.0	2.8
" " more than 7 "	1.8	.8
	100.00	100.00

The plan under which the meters were tested is as follows: The services of a good meter repairer are procured, and he is set to work at the meters on hand. Papers like the following sample are filled out—one paper for each meter—giving the description of the meters already in use; and these are arranged by streets:

..... Gas Company.

..... 188

Test Meter.

Order Number .....
Name .....
Premises .....
No. of Meter .....
Company's Number .....
Size .....
Maker .....
Index .....
Percentage fast or slow .....
State if corrected .....
Repairs made .....
No. of Meter set .....
Company's Number .....
Size .....
Maker .....
Index .....
Date when done .....
Done by .....

Entered.—Order Book, Page.....by.....
Consumer's Ledger, " .....by.....
Statement Book, " .....by.....
Collection " " .....by.....
Meter Record Book, " .....by.....
Meter Test " " ..... by.....
Location " " .....by.....
Manufacturer's Record, " .....by.....

A gasfitter then takes the papers for a certain street or section of a street, selects a load of a dozen or more meters corresponding in size with those on the papers, and which have been already tested and repaired, and starts out. As he enters a house he takes with him a meter of proper size; but before taking down the meter already in use he checks on the paper referred to its description—*i. e.*, the number of meter, company's number, size, and maker, and also the statement. He then sets the new meter, and after it is set writes on the same paper before mentioned its description and its statement, then fills in the date and his initials, and goes out carrying with him the old meter. In this way but one visit is made to each consumer. When the entire load of meters has been set, he brings those taken out to the meter repairer. The latter reads off the statement of each meter, and checks the same on the corresponding paper. The meters are then tested carefully, and all necessary corrections and repairs are made, and the hands on all the meters, up to and including twenty lights, are set back to zero. This last is done to avoid mistakes, and to satisfy consumers that no mistakes have been made when the next bill is presented. The meter repairer enters on each paper the percentage fast or slow, and if he corrected same, and what repairs if any were made. These papers are then taken to the office, and entries are made on the different books; and as each entry is made the person making the same fills in the page of the book and his initials at the bottom of each paper.

It is but proper for me to state that this paper is copied almost entirely from those in use by the Providence Gas Company, to whose genial manager, Mr. Slater, I am under very great obligations both for this and many other favors.

Naturally the question will be asked does it pay? Here is an outlay of $1.50 on each meter, to say nothing of the annoyance and trouble in the office caused by the change. In reply the writer can only give his individual opinion that it does pay—perhaps not directly, but indirectly he believes it yields a handsome return. The meters which have commenced to gain or lose are checked in their career, and the manager escapes, on the one hand, the annoyance of being compelled to test the meter by the complaints of his consumer, and perhaps the mortification of finding it exceedingly fast; and on the other hand, he escapes the loss caused by meters running slow, and which may continue so long as to become a serious drain on the finances of his company. Personally I would rather have fifty meters tested than to meet in a single case with either experience.

Besides, I can but believe the moral effect on the consumer is good. He sees the gas company not satisfied to let matters take care of themselves, but trying, entirely at their own expense, to ascertain if their meters are correct; and if he be a fair man his respect, and with it his liking for the company, must increase.

Before closing this paper I desire to call your attention to a matter which has never to my knowledge been alluded to in any paper read before this Association, and that is the method of keeping a record of the meters used—the work done by each meter, its life, repairs, testings, etc. Previous to adopting the system which he has now the writer had a very unsatisfactory method which gave no information whatever—and he hailed with a great deal of pleasure the system which originated with the New York Society of Gas Lighting. This system of meter records was reported to the Society, in July, 1876, by a committee consisting of Mr. A. M. Smith, of the Manhattan Gas Light Company, Mr. Wm. Farmer, of New York, and the late Major Geo. W. Dresser.*

In the language of the minutes of the Society "the committee were to devise a system of meter records by which it would be possible to trace the entire history of each and every meter from the time it was bought until it was condemned."

The principal feature of this system is the adoption of what the committee call the "Company's number." Quoting from the report of the committee: "Each company is to number all meters received consecutively by a small brass stamp soldered on to the case when first received at works. In case of meters on hand and in use the numbers to be attached as they come in for test or repair. These numbers to remain during the life of the meter, and when the meter is condemned, the number to be condemned also—*i.e.*, never used on another meter. This number to be the index for identification of all meters."

I think it will at once occur to every one present that this system of numbering meters is a great convenience. Perhaps an illustration of their service in one instance to the writer may enforce the point. When the testing of the meters had been nearly finished last summer it was a little uncertain if all the meters had been brought in, and to ascertain the fact a sheet of consecutive numbers was prepared from one to the number of the last meter purchased. The number of each meter which had been tested was then read off from the papers used by the meter repairer, and checked on the sheet of consecutive numbers. When all had been read the numbers not checked were the meters which had been previously condemned, thus showing that all the meters belonging to the company had passed through the repairer's hands. It can readily be seen that the information was obtained in a very short time and with very little labor.

The principal books recommended to be kept by this committee are as follows, and the language of the report is again quoted:

"The Meter Record Book, ruled as per paper A, will show company's number, maker's name, maker's number, size, kind, date of purchase, location (meaning page in Location Book), when repaired, why repaired, by whom (these four items repeated), when condemned, length of service, remarks. Location of Meter Book, ruled as per paper C, will have an appropriate space allotted to each street by itself to show where the service is performed by each particular meter.

"Meter Test Book, ruled as per paper B, will have an index book accompanying it, with company's numbers running consecutively, and showing date of test for each number, which will, by reference to that date in Test Book, give all particulars of test. This book will run according to date.

"Record of Makers, ruled as per paper D, to show duty performed by each particular meter."

As the writer had no voice or hand in devising this system, and was not a member of the society when the report was made, he hopes it will not be considered out of place if he devotes to it some words of praise. After using this system for nearly three years, I can only say that which is in its favor. If it has any weak points I have not found them. It accomplishes perfectly what the committee intended it should—it traces the entire history of each and every meter. Every question, or almost every question, in relation to any meter can be readily answered by referring to one or other of these books. It can be truly said of it that it is a splendid system, well thought out.

In conclusion, gentlemen, what I have tried to show is that it is desirable to test meters periodically—that when they are so tested at not too infrequent periods, that most register correctly, and the variation of all meters from that point is so slight as to do but trifling injustice to either consumer or gas company, and further, that a system of meter records can be easily maintained by which the life of each meter can be fully written in a few words and figures.

On motion of Mr. Starr a vote of thanks was tendered to Mr. Nettleton.

Discussion.

Mr. J. C. Pratt—I want to say a few words on the subject treated of in this paper. The company (Jamaica Plain, Mass.) that I am connected with has been endeavoring for several years to educate its consumers up to the

* Since writing the above it has come to the writer's knowledge that this system of meter records was designed by Mr. Eugene Vanderpool and Mr. J. P. Dusenberry, the President and Secretary of the Newark Gas Light Company, and had been used by that Company before this report was made to the Society of Gas Lighting.

idea that the gas meter is an instrument as nearly perfect as is possible for human invention at the present time to make it; and that there are no bills presented to them over which they have so much careful guard against fraud as they have over their gas bills. We have instructed our men as they go around every month not only to take the state of the meters, but to hear any complaint from any customer, and then to carefully investigate the reasons advanced. We instruct them to spend just as much time as our consumers wish in giving a clear and perfect explanation of the operation of the meter, and to so instruct them in the method of ascertaining the amount of gas consumed in order that whoever can read the time from the dial of a clock can read his gas bill from simply looking at the meter dial. We desire to satisfy them fully that there can be no fraud. We have accomplished a great deal in this way. Many of our customers can read the meters just as well as we can ourselves. A year ago last summer we undertook to carry out an entire inspection of our meters. That is, we inspected every meter which had been placed in position for more than one year. Although I have not got with me the details of that inspection, I may state that our method was a little different from the one described by Mr. Nettleton. Every morning we started out a couple of men, with instructions to remove the meters from a certain district. They would collect at one gathering a dozen, fifteen, or twenty, and bring them to the shop, where we have installed a perfect set of testing apparatus. Those that the tests showed to be correct, or within a variation limit of about two per cent., were returned before nightfall of the same day to their former positions. Those proved by the tests to be either fast or slow were replaced by new ones. We continued this process from day to day, until the entire ground was gone over; and we pursued this course as much for the purpose of satisfying the people as to satisfy ourselves. We know that the meter is a prolific source of trouble, and is continually being blamed—indeed, is almost universally complained of by the consumer as a means for perpetrating fraud. We publish a printed annual report, doing that also as much for the benefit of our consumers and the people of our town as for the information of our stockholders. We distribute that report among the residents in order to show them just what we have been doing; how much money we have earned; how much our profit account foots up—in fact, we give them the identical information that we furnish to our stockholders. Among other things mentioned in our last annual report, we stated:

"During the last summer we have had a thorough and careful inspection of our meters. Every meter in use by the company, excepting those placed within the year, was taken out and submitted to a thorough test, the result of which is highly gratifying to us, and should be to our consumers. A very few registered fast, and those only averaged three per cent.; while the general average of all our meters shows about two per cent. slow."

Those reports we give to the people in order to show them that we are not cheating them with our meters; and I may add the distribution of the reports has given very great satisfaction.

The President—Another gentleman has also contributed a paper on this same subject, and perhaps it would be as well now to listen to its reading, so that this discussion might be made in conjunction with whatever new features are developed in the second communication. If no objection be offered to this course I will call upon Mr. E. McMillin, who is the author of the second paper on the subject of meters.

Mr. Emerson McMillin—It seems almost unnecessary for me to present and read the paper I had prepared on this subject, since the ground has been fully and carefully covered by Mr. Nettleton. It seems to me that my paper would be only but a confirmation of what he has already stated. I must add had I known that Mr. Nettleton was engaged in the preparation of any such paper as the one presented by him to-day, I would not have prepared mine. His is certainly one of the most carefully prepared communications that I have ever heard read in this or in any other Association; and so I fear that my contribution will appear very tame when placed in comparison with his. My paper in any event is simply a confirmation of what Mr. Nettleton has so fully established.

The President—I am sure the Association would like to hear from Mr. McMillin.

No objection having been made to the course proposed by the Chair, Mr. E. McMillin, of Columbus, Ohio, then read the following paper on the subject of

REGISTRY OF METERS.

Under the above title the writer read a short paper before the Ohio Gas Light Association, at its first meeting last month (September); and with the risk of repeating myself a little I shall give not only the records presented in that paper, but, in addition, furnish the result of tests made by Prof. Wormley, our State Gas Commissioner, on 2,122 old meters.

In the paper read to the Ohio Association I gave the results obtained in the testing of 2,200 meters as they came from the maker's shop, and before gas had been passed through them. Also results obtained in the testing of 282 old meters, mostly removed at request of consumers.

Of the new meters there were found to be 708, or 32.18 per cent., fast; 1,108, or 50.4 per cent. slow; about 17.4 per cent. being exact. But all of them (2,200) varied less than three per cent. from exact; and there were but few showing a variation from exactness of more than one per cent.

You will observe that of the meters not absolutely correct, nearly 50 per cent. were shown to be more slow than fast.

Of the 282 old meters tested by our company there were 107, or 38 per cent., fast; and 125 or 45 per cent., slow; 17 per cent. proving exact. Notice that nearly the same per cent. of old and new meters are exact—17 per cent. in one instance, as against 17.4 in the other. The slow meters averaged 3.25 per cent. slow; while the fast meters averaged 2.63 per cent. fast, or a general average of .44 of 1 per cent. slow.

From Wormley's register we calculated the following results: 720 meters, or 33.9 per cent., registered fast; 1,118 meters, or 52.7 per cent., registered slow. Please notice again the striking similarity of results obtained in the testing of 2,200 new meters by our company, and the testing of 2,122 old meters by Prof. Wormley. Both the number and per cent. of meters registering fast and slow are almost identical in each register. Of the meters recorded fast in Wormley's register, 78.4 per cent. registered less than three per cent. fast, and were considered correct; 6.4 per cent. registered between 3 and 5 per cent. fast; 11.4 per cent. between 5 and 10 per cent. fast; 2.6 per cent. registered between 10 and 15 per cent. fast: 1.1 per cent. registered between 15 and 20 per cent. fast. Bear in mind that the percentages here named refer to the number of fast meters, and *not* to the total number tested. To reduce the figures here given to per cents. of the whole number tested, divide by 3.

Of the slow meters, 77.7 per cent. registered less than 3 per cent. slow; 7.7 per cent. between 3 and 5 per cent. slow; 12.1 per cent. between 5 and 10 per cent. slow; 2.1 per cent. between 10 and 25 per cent. slow; two-tenths of 1 per cent. registered between 15 and 20 per cent. slow. In this case to reduce the figures given to per cents. of the whole number, divide by two.

The fast meters (of the old lot tested by Wormley) averaged 2.82 per cent. fast; the slow meters averaged 2.7 per cent. slow.

Of this lot there were 266 meters, or 12.5 per cent., exact; and 18 meters, or less than 1 per cent., which failed to register. Excluding these 18 meters, the total number averages .47 of 1 per cent. slow.

These meters had been in use—many of them at least—for several years. Up to this time (1871) there had been no regular system of testing, and but few had been proved until the general test was made. It appears from the above figures that while there were special cases of injustice, yet, on the whole, the public were receiving all the gas they paid for, and the gas company was being paid for about all the gas it delivered to consumers.

Recently there were similar records presented to one of the English Gas Associations in which 28½ per cent. of the meters are reported fast, and 30.69 per cent. reported slow. From this we infer that about 41 per cent. were correct. The fast meters averaged 4½ per cent. fast, and the slow meters 12.92 per cent. slow. From these figures we calculate that the whole lot averaged 2.74 per cent. slow.

Another English engineer reports the result of testing 10,500 meters about as follows: 48.77 per cent. correct; 25 .5 per cent. fast, and 22.6 per cent. slow. The slow meters averaged 8.21 per cent. slow. The average per cent. of error in fast meters was not given; hence the general average of the whole lot cannot be calculated

The per cent. of correct meters, in both of the English cases referred to, seems large; but they doubtless were correct only within the meaning of the law or custom, and not exact.

In presenting this paper to the Association, I do it with a view of getting the figures into a permanent record, rather than with any hope of specially interesting the members present.

On motion of Mr. Helme, a vote of thanks was tendered to Mr. McMillin.

Discussion.

The joint discussion on the subject was then proceeded with as follows:

Mr. R. J. Monks—A few days ago I received a note from the Secretary of the Association inviting me to say a word or two upon this matter of meters. While in general terms I agree with what has been brought forward, and have been very glad to hear what has been said on the subject, yet, for the sake of argument, what little I may now mention will be in support of the ground that it is in the line of mistaken policy to take out all the meters of any company with a view to testing them once in three years. The principal objection which occurs to my mind is that we are engaged in a business in which there is a great deal of prejudice shown against us; and the people with whom we deal either think that the gas manager is not disposed to do them justice, or that, to put it mildly, our machinery and methods are not accurate. This is particularly true with regard to their ideas concerning the gas meter. A common old saying was, "He lies like a gas meter;" and a multitude of people in my own community (and from hat I am led to pre-

sume they will be found in other communities) are in the habit of saying disrespectful things with regard to our meters. We claim that they are instruments which measure accurately; and I think the paper last read is a good demonstration of the truth of that fact. It certainly is proved, from Mr. McMillin's figures, that, after a period of from fifteen to seventeen years' use, a number of meters, corresponding almost exactly with the number of meters employed by my own company, were tested with the result that the inaccuracies were scarcely perceptible. If, after seventeen years' wear, a watch, upon careful testing, should be found to have run as accurately, it would indeed be a compliment to the skill of the watchmaker. Now, should a manager of a large company decide at any one time to take out all the meters in use by such company, with the idea of having them inspected, the consumer may be very apt to put a bad interpretation upon the operation, more particularly so as he is apt to put a bad interpretation upon everything connected with the gas industry. In this connection I want to read you a little slip extracted by me some months ago from the columns of a Boston newspaper, and which I think very correctly shows the general feeling of communities in this respect:

"A Yellow Paper that Caused Commotion in the Chinese Legation.—The Chinese Minister, Mr. Tsao Ju, is the most deliciously absurd old person, writes a Washington correspondent. He knows about seven words of English, but has a spry young secretary who knows the whole English language. One day not long since Mr. Ju, stepping out of his front door, saw a printed yellow slip, which had been left by the gas man, lying in the vestibule. Now, yellow paper in China signifies the death of a very distinguished person; so Mr. Tsao, in much agitation, sent for the interpreter. The interpreter had gone off to the Theater Comique, and so the legation was left to wrestle with the gas bill alone. The whole suite was summoned, and it was concluded that the President was defunct and this was the official notice. Mr. Tsao immediately retired to the drawing room with his suite, had every window shut up, and, placing the gas bill upon an effigy of Confucius, he and his suite proceeded to hold a Chinese wake. They howled in chorus and they howled separately. The Minister howled for an hour in the blue petticoat he usually wears, and then changed it to a yellow petticoat and howled more vociferously than ever, while he beat his breast and tore at his queue. An African lady employed about the kitchen peeped through the door after hearing the hullabaloo, and seeing the gas bill, and knowing the methods of the Washington Gas Company, retired, thinking it nothing remarkable that people should howl over the gas bills of the Washington Gas Company. A policeman, accompanied by a section of American youth, pounded at the back gate and demanded to know who was being murdered by Mr. Tsao Ju. The African lady explained that 'Tisn't nuffin' but de gas bill, and dat's 'nuff to make folks holler.' The policeman, seeing the reasonableness of this, departed. After five hours of bawling, interspersed with tea, fire-crackers, and Chinese hymns, the interpreter returned—and it was found, instead of the President being dead, the gas company merely demanded about $25 for burning about $7 worth of gas."

Now, gentlemen, this is a little digression from the subject in hand, but it serves to show the prejudice which the community has against us who are of the gas fraternity. It is very desirable for us to overcome that prejudice. The first thing for us to do, so far as we are concerned, is to have an accurate meter inspector—who will make no mistakes in reading the dial; for we must hold an incorrect reading as an unpardonable sin. Our company (the South Boston Company) is one of the sub-companies of Boston. We have two meter inspectors attached to our company. I used to hear, among the better class of my customers, a good deal of comment upon the meter. They would say they were satisfied that the men in charge of the company's affairs were honorable men, but were equally frank in asserting that they had no faith in the meter. I adopted a plan for convincing the people of the reliability of the meter as an accurate instrument for the measurement of gas, which has succeeded so well in effect that I think it might be adopted elsewhere to advantage. We had constructed for us a meter set in a plate-glass case, with a nickel plated frame just large enough to firmly hold the glass; the meter itself was nickel plated, and it had a plate-glass top. That meter was placed in front of the cashier's desk in the collection office, where everybody who came in to pay a gas bill could not help noticing it, and could see in every detail just what a meter was like. Sometimes, when I would meet a gentleman on the street who would speak to me about his gas bill, usually ending up with the intimation that the meter was an unreliable affair, I would ask him to step into the gas office. Connected with the meter, in the plate-glass frame, and close to it, there is situated a tube or bar (also plated) about 4 feet in length, and on this bar, in an upright position, are arranged gas heaters as well as burners—we were trying to introduce into use gas heated nursery stoves, etc. The meter is so placed as to show the action of the diaphragm, and the effect on it of using one or more burners. As the first move, I would start one light; the meter would commence to move, but the action would be so slow as to be hardly perceptible. Then I would turn on three, four or five burners, and then of course the meter's action would be greatly accelerated, and immediately the dial would indicate the quantities of gas being consumed. This test would speedily satisfy the consumer witness that the meter *did* measure the gas, and convince him that it would register the amount consumed with *some* degree of accuracy. This is a device which I think some other gentlemen of the convention might well adopt to their advantage.

Before coming to this meeting I requested our Assistant Superintendent, Mr. Jones (whom many of you doubtless know), to prepare a statement regarding the experience of our works in respect to this matter of meters. In compliance with this request he wrote me a letter, which, with your permission, I will now read:

"South Boston (Mass.) Gas Works, Oct. 11, 1884.

"R. J. Monks, Esq., Treasurer:

"Dear Sir—During the five years from 1879 to 1883, inclusive, the South Boston Gas Light Company has caused to be removed and inspected by the State Inspector (an official appointed by the State) 57 meters, by request of the consumers of gas through these meters who believed them to register more gas than they really passed. Of these 57 meters, 30 were found to be fast, or against the consumer; 6 were shown to be slow, or against the company; 20 were found to register correctly; and one proved very irregular—at first failing to register at all, and afterward registering 18 per cent. fast.

"The extremes were 14½ per cent. fast and 13½ per cent. slow, without making any account of the one returned as irregular. Of these meters, 56 were made by Tufts Bros., and one by Thos. Glover, of London, England. The average of the fast was 7.08 per cent.; the average of the slow was 5.28 per cent.

"It has been the custom of this company, upon finding that a consumer's meter registered no gas after two or three months' inspection, to remove it and test it at the works to ascertain if it were stopped. Of course, these stopped meters are never tested by the State Inspector when removed, as consumers have never reported, nor called to see why they received no bill—with one single exception—in eight years' experience. During the five years 65 meters were found to have stoppped registering, the details being as follows:

"Year 1879.—Total meters stopped, 18; of which 8 were two-light, 7 were three-light, and 3 were five-light.

"Year 1880.—Total meters stopped, 15; of which 5 were two-light, 6 were three-light, 3 were five-light, and 1 was ten-light.

"Year 1881.—Total meters stopped, 6; of which 3 were three-light and 5 were five-light.

"Year 1882.—Total meters stopped, 7; of which 6 were three-light and 1 was thirty-light.

"Year 1883.—Total meters stopped, 19; of which 2 were two-light, 14 were three-light, 1 was five-light, and 2 were ten-light.

"If the 65 stopped meters tested were included with those found slow, and an average taken (calling each meter stopped 100 per cent. slow), the average slow will be 92.14 per cent.

"Our meters are principally of one firm's make (that of Tufts Brothers, known of late years as Nathaniel Tufts), but there are a few two and three-light meters made by Thomas Glover, of London, England, and possibly a dozen made by the American Meter Company; so that the foregoing cannot be taken as a criterion of the merit of one kind of meter.

"The law in Massachusetts regarding the inspection of meters allows 2 per cent. fast or slow; so that a meter registering either way within the two per cent. limit would be considered correct. Eight of the 30 meters found fast were but 2½ per cent. against the consumer.

Very respectfully,

"Edward C. Jones."

I will repeat, in conclusion, what I said at the commencement. It seems to me, in view of the last paper which has been read here, that if, for the period covering the lengthy time specified, a test of over 2,000 meters has shown that they were substantially correct, it is a good demonstration of the fact that the gas meter is more accurate than the average watch; and I again repeat that to take out all the meters at any one time will tend to create a suspicion among consumers that we believe the instruments are inaccurate. Taking this view of the matter, would it not be better policy to make the tests from time to time whenever the superintendent, or someone else posted in regard to their working, thinks that inaccuracies exist, rather than have them all tested at once?

Mr. Eugene Vanderpool—I want to add a word to what the gentleman has said. There is one question which does not seem to have been discussed. Suppose, for instance, a consumer comes into the office and complains about his gas bill or about his meter; and then afterwards an investigation and test of the meter proves it to have been 10, or even 15 per cent., fast. Unless you have kept a record of the meters, how will you arrange that bill with your customer? How far back are you going in the effort to make an equitable correction? We found that trouble; and so we introduced the system of periodical testing. We have followed it for nine years; and our present practice is to make a test of every meter at least once in three years. I was

very much impressed with the paper of Mr. McMillin in reference to the coincidence in the percentages of the meters—how nearly they ran together. We have tested a great many thousand meters, and I find that our record for the last six years shows that of all the meters taken out, 79.56 per cent. were found correct, or within the two per cent. which the law calls for. The variation of all the meters tested shows .14 of one per cent. slow; this fractional result covering tests of many thousand meters. When we first started the tests we found that the average was 59.25 per cent. correct, and that the percentage slow, or against the company, was greater than it is now. But the difficulty which I have suggested arises in respect to the settlement of bills. In Louisville, Ky., they had a difficulty of this kind. The consumer made a complaint, and the matter was taken into court. It was a very long time before the case was settled, and the settlement was a very expensive matter.

Mr. McMillin—With us, if a meter was found to register 5 per cent. fast, we searched back to determine the period when it was known to be correct—either at the time it was set, or at the time it was tested. We solder to the meter a brass tablet bearing date of the test. In the situation spoken of by Mr. Vanderpool we refer back to that date, calculate 5 per cent. for six months on the gas bill, and strike a general average. If the meter is slow we pocket the loss.

Mr. T. D. Gilbert—While we are on the subject of gas meters I would like to ask if anyone of the gentlemen present has ever had any experience with the itinerant meter tester; and, if so, how he felt about it. I have had some experience myself on that score, and when I found that such a party was going the rounds of our city, I immediately went to him, telling him that I should not put any obstacles in his way, but that I wanted him to report to me every night the result of his observations. He promised to do so. As I heard nothing more from him for a while, I concluded that he had abandoned the business. But shortly there appeared in one of our daily papers a notice that such a man's meter registered 15 per cent. fast, as had been determined by "an expert meter tester" who was in the city prosecuting his researches. Of course, then the trouble commenced. I immediately followed in the wake of his operations, removed the meters to our works, tested them, and found that in every case (without a single exception) the matter was magnified. It was plain enough to see what the "expert's" object was in having his story published. I found in some cases that the meters proved by the "expert" were a little slow; but those particular consumers had not made any fuss over the fact. Taking it all in all, we had quite a lively time with them for perhaps a month; and the upshot of the affair was this: whenever anybody came into the office with the purpose of advancing the opinion that his meter was fast, we would say to him: "If you will go with us now, or at any hour you may name, we will take your meter down to the works and test it in your presence. We will not have it done in any other way. We will test it only in your presence. The process is perfectly simple; any child can understand it." While we have had a very few cases where people are willing to put themselves to that trouble, we found that the great majority of them had greater faith in the meters than they professed to have when first they came to complain about them. Since we have adopted this course, and have followed the plan of fully instructing our customers in regard to reading their own meters, furnishing them with cards containing full instructions about it, we have had very little trouble. If any one here has had any experience with such itinerants, I would like to know how he has dealt with them, as I think very likely they may be roaming around the country again this winter. If there is any method of dealing with them effectually I would like to know it.

Mr. W. H. Pearson—It is of prime importance in such cases that every gas company should have a duly constituted authority to which appeal may be made. It is of interest to every gas company that there should be a proper and equitable government inspection act. It would certainly get over the difficulty which our friend Gilbert has had to contend with. I am quite satisfied that the consumers possess a little more faith in gas meters than they profess to have. Before the Government Inspection Act was passed in the Dominion of Canada (and then it cost the consumer nothing for having a test made) we had a great many more people who desired to have their meters tested; but when the act became operative, in the event of their having to pay for the testing if the meter was found correct, they began to think the meter was not quite so far wrong as they had supposed it was. I am quite satisfied it is to the interest of all gas companies to court investigation as far as possible; and that in this respect it is a very important matter there should be a government inspection. With regard to the percentages of slow and fast meters as shown by the tables which have been presented, I wish to say that I have been struck with the very great similarity between those tests and the tests that have been made in Toronto, during a period of six or seven years, since the Government Inspection Act clauses were inaugurated. With us as a rule (just as we heard it stated here) the percentages are somewhat against the gas companies. Now as to whether or not (considering the money expended) it pays a gas company to have such test made; speaking for myself, I may say I am of the opinion that the practice does pay. The annual cost to our company for testing meters (we have about six thousand consumers) is about $1,200, and I am satisfied that this money is well spent, if for no other reason than because of the increased amount of confidence in his meter which the consumer appears to have. It is not a high sum for a large company to pay. The company may not entirely recoup itself in the money outlay; yet, if we come to calculate the matter closely, I am not so sure but that the annual expenditure may possibly be offset by the additional amount of gas registered—arriving at this idea from a knowledge of the fact that the average of tests always appears to show a certain general percentage of registration as against the company. Be that as it may, the great compensating advantage to a company undoubtedly appears to lie in the increased amount of confidence which a Government inspection inspires in the consumer. It is my positive belief that the members of the Association residing in States where no Governmental regulation exists would find decided benefit (instead of opposing such measures) in doing all that would lie in their power to have such Acts become law.

Mr. Littlehales—There is another point I would like to refer to, and that is the necessity of trying to satisfy consumers who come to our office to complain of their gas bills. There occurs to my mind the instance of one gentleman who may justly be set down as a chronic grumbler. On a certain occasion he was particularly positive that his gas bill was too large. We said to him: "Let it go for a few days, and we will try to find out what the trouble is." We then had his meter read every day for a week, so as to ascertain as nearly as possible what the daily ratio of consumption was. At the end of the week I went to him with the figures and showed him that the average of the experimental week's consumption just exactly tallied with what he had been charged by the quarter. One day he had burned two hundred feet; another day seventy-five feet; and on a third day the consumption was only twenty-five feet. I said to him: "Your consumption appears to have been quite irregular last week, as on a certain date you only burned twenty-five feet." He asked: "What day was that?" I replied, mentioning the particular date. He exclaimed: "Oh! I was out that night." During the twenty-four hours when the consumption had been 200 feet he admitted that there had been an entertainment at his house. Our record of the week's reading proved to him in a practical way that his meter was reliable. Just the nights when he was away from home, and when he had only a hall light burning, the consumption was shown to have been the least; but on the night when he had the entertainment the meter reading vouched for the increased use of gas. The state of the case was quite plain, and at the close of the conversation our erstwhile irate customer gracefully said he was sorry we had taken so much trouble over the case, closing with the statement that he had no doubt the bill was all right. I merely mention this incident to illustrate the necessity of doing our very best—of sparing no trouble, however much of time it may take—to give our consumers satisfaction. Another case occurs to me. A gentleman, now one of our judges, complained that a certain gas bill was very large. He wrote us a letter in regard to it, saying that he wanted to pay what was right, but claiming this bill was so extortionate that he would not pay it unless the company would sue him. I allowed a day or so to elapse, then wrote to him that the company only wanted to charge him what was right, adding if he would come down to the works and see his meter tested I thought he would be satisfied. So, he fixed a day when he said he would do as suggested. We had his meter removed and brought to the office—it had been doing duty for ten years at his house, but, even after that interval, no new meter could have possibly worked better. I tested the meter in his presence, explaining the operation to him so that he thoroughly understood it. He said he would go home and draw a check for the bill; and he never complained to us after that. I think it a decidedly profitable policy that companies should spare no trouble in their attempts to give consumers entire satisfaction.

Mr. Helme—Mr. Nettleton suggests that a good deal of trouble arises from the want of knowledge on the part of the public with regard to the meter. I have no doubt a great deal of trouble does so arise. The University of Pennsylvania, a year or two ago, did what I think was a good thing in installing as a part of their mechanical department a set of apparatus designed to afford instruction to the students in the matter of gas measurement. If you gentlemen, who represent almost all sections of the country, could induce the managers of colleges and universities in your neighborhoods to follow that same practice it would, in a few years, afford the gas fraternity no inconsiderable relief. You yourselves know, and we all have ample confirmation in the facts presented in the papers of Messrs. Nettleton and McMillin, that the meters are not, on an average, far from correct; and also that whatever average variation does occur is really against the company, and consequently in favor of the consumer. I am told Dr. Ford testifies that the average of meters varying from correct, in the case of the Washington Gas Light Company, is against the company. If the universities and colleges throughout the country would follow the course practiced by the University of Pennsylvania, and make these subjects form a part of the

daily instruction of the students, we would be helped thereby very much indeed.

Mr. Littlehales—The remarks of Mr. Helme recall to my mind an incident which occurred to us a few years ago. Another of the chronic grumbling class called at our office and claimed that we had been charging him for three or four times the quantity of gas consumed by him. He repeated the familiar complaint that his neighbor was burning four times as much as he, but was only being charged one quarter as much. This happened at about the middle of a month. I told him I would look into it. That day I directed that the meters supplying the two houses should be changed; and consequently we had at the end of the thirty days one-half month's consumption of each party. The result of the experiment can readily be imagined. The chronic grumbler who thought he had a fast meter, found that his neighbor's meter was equally fast; and that with what he had believed a slow meter he had burned an equally large amount of gas. We have had no trouble with him since.

The President—If there are no further remarks to be made on this subject, we will proceed to a consideration of some of the pressing routine business of the Association.

[To be continued.]

[A Paper read before the Society of Gas Lighting.]

Result of Changes Made in Location of Some Pieces of Apparatus at the Works of the Providence (R. I.) Gas Light Company.

By A. B. Slater.

In the construction of gas works, and the arrangement or sequence of scrubbers, condensers, washers, exhausters and purifiers, engineers entertain widely different views, arising, doubtless, from their varied experience, as well as difference in education and actual knowledge of the requirements necessary in the treatment of the gas during its various stages of manufacture, or until its delivery into the receiving holders. The old idea of condensation by temperature, for the removal of tar or the heavier hydrocarbon vapors, is now largely abandoned; and the other extreme, or condensation by hot scrubbing, has in many works taken its place.

The object of this paper is not a dissertation on the various theories now in vogue respecting the treatment of gas during its manufacture, but rather to describe, in a few words, the alterations and changes made in location of some of the apparatus at the South Station of the Providence (R. I.) Gas Light Company; also a comparison of some of the working results before and after the improvements were made, hoping to call out in the ensuing discussion the views or ideas of the members of the Society relative thereto.

The works were originally constructed for coal gas works, the gas to be enriched to the required standard of illuminating power by the use of naphtha. The naphtha was injected, by air pressure, on to an iron pan laid on the bottom of one or more of the retorts in a coal bench, according to the quantity of gas being made, and on striking the iron pan was supposed to be vaporized, and converted, during its passage to the mouthpiece or stand pipe, into a fixed gas. The first treatment received by the gas was in its passage through a small scrubber, about 6 feet in diameter and 10 feet high, in the central portion of which was placed about five feet deep of scrap tin, and which was showered by a copious supply of cold water. The next apparatus in the series were three cylindrical multitubular condensers, which were about 10 feet high and about 5 feet in diameter, each divided perpendicularly through the center, so that the gas passed up one side and down the other. From the multitubular condensers the gas entered another scrubber, similar in dimensions, filled with about the same quantity of scrap tin; and this, too, was showered with cold water. The gas then passed to the exhauster, purifiers, station meter, and holders, in the usual way.

When the works were operated by the Citizens Company the exhauster was run at a speed which produced a vacuum of about eight-tenths of an inch of water, and the production per pound of coal, including the naphtha was (say for the year 1878) 6.51 cubic feet; the yield per retort, 6,392 cubic feet; the candle power, 18.71—the latter having been reduced somewhat from the average of previous working; and 59½ gallons of naphtha were used for each ton of coal carbonized. The naphtha was largely converted into vapor simply, and this vapor condensed more or less throughout the works and at dips of the holders; also, a considerable portion condensed in the consumers' meters, and showed itself, to some extent, in the stopcocks of the consumers' fixtures. When the gas was enriched to over 20 candles, as was frequently the case when the wo ks were first started, it smoked badly unless consumed through small burners.

Notwithstanding the gas passed first through the scrap tin scrubber, through the three multitubular condensers, and the second scrap tin scrubber, so much heavy tar passed the whole apparatus to the exhauster that the works could be run but a few days at a time, when it became necessary to shut them down, take off the head of the exhauster, and clean out the thick tar—only to repeat the operation in a short time. The tin in the first scrubber would soon get clogged with thick tar, which was more or less chilled by the cold water, causing heavy back pressure; so that it was necessary to clean this often also. A large portion of the ammonia went over to the purifiers; and when lime was the material used for purification, a considerable portion passed on to the holders, and so with the gas sent out—excepting when naphtha was used for enriching. When iron sponge was employed as a purifying agent more ammonia was arrested in the purifiers.

When the Providence Gas Company took possession of the Citizens' plant, in order to ascertain what the works were doing they were operated for a time in about the same way as they had been run by the Citizens Company; but enriching with naphtha was afterward abandoned, and iron sponge substituted for lime in the purifiers. In this way the works were operated until the first of last May, when the fires were let down and the works closed for alterations and repairs, which had long seemed to be necessary, not only to secure easier and better working, but also in the expectation of producing better working results.

I should have stated that soon after the works were transferred to the Providence Gas Light Company a Smith & Sayre exhauster and Fuller engine were added to the plant; the original exhauster was also abandoned and removed, its place being supplied by another Smith & Sayre exhauster. Dieterich furnaces were also introduced for heating the retorts in place of the ordinary furnaces.

The plan of changes first considered was to remove the exhausters from their location to a position next the hydraulic main; connect, at the end of the stacks, two of Hutchison's patent hydraulic main tar displacers; pass the gas from the exhausters through the three multitubular condensers; then through the scrubbers to a "Standard" scrubber; then to the purifiers, station meter, and holders. But during the writer's visit at St. Louis, Mo., in May last, and afterward at Chicago, Ill., he found the Pelouze & Audouin condenser doing most excellent work in removing the tar from the crude gas. This being a fact, it at once occurred that if the Pelouze & Audouin condenser would accomplish the same result at the Providence works, we could easily reduce the temperature of the gas, with the multitubular condensers, to a point where the scrubbers would remove the ammonia from the gas; and also, in making the changes contemplated, a saving of several thousands of dollars would be effected. Again, if the tar was taken care of before the gas reached the scrubbers, they could be filled with coke, which is one of the best of scrubbing materials, provided no thick tar goes forward to clog it up.

Correspondence was at once opened with Mr. James R. Smedberg (the agent in this country for the sale of the Pelouze & Audouin condenser), which, in a short time, resulted in a conditional contract for a machine of 1,000,000 cubic feet capacity per 24 hours. During the summer the exhausters and engines were removed from their old location and placed so as to take the gas directly from the hydraulic main, to which were connected two of Hutchison's patent tar displacers, and on to the series of apparatus following—first, or next the exhausters, the Pelouze & Audouin condenser; then the three multitubular condensers; then the two coke scrubbers, purifiers, station meter, and holders.

The alterations being completed, the works were started on the sixth day of October last, and the results seem to justify our anticipations. The Pelouze & Audouin condenser is doing the work of removing the tar admirably.

While we have not yet succeeded in completely removing the tar with it, (as we find slight traces of tar, but more especially oily matter, at the outlet), yet the gas is so clean at the outlet of the third multitubular condenser that no stain is left upon clean white paper when a jet of the gas is impinged upon it; consequently no tar enters the coke scrubbers, where the ammonia is easily removed from the gas by a small quantity of water.

During the first 15 days of the present month, with Dieterich furnaces and the smaller size of Davison retorts set in 7′ 2″ × 9′ arches, with three-hour charges, and with 31.35 per cent. of the coke made, we carbonized 1,251,835 pounds of coal, and made 6,492,000 cubic feet of gas—being an average of 5.10 cubic feet per pound of coal, and 10,636 cubic feet per retort in actual use.

To make a comparison with the results obtained previous to instituting the changes, the same furnaces and retorts being used, the average production was 4.82 cubic feet to the pound and 8,522 cubic feet per retort.

The question has often been asked, "Why place the exhausters next the hydraulic main?" when the experience of many if not most engineers favors placing them after the condensing and scrubbing apparatus, and before the purifiers. My own experience leads me to believe that the proper place for the exhausters is next the hydraulic main, and for at least two principal reasons:

Firstly. There being no apparatus between the exhausters and the hydraulic main, they work directly from the hydraulic main; work easier, more steadily and surely.

Secondly. Because the gas comes over hot, the exhauster is always lubricated, the tar is always limpid, and no trouble ever happens from thick or chilled tar, as is often the case when the exhausters are placed after the condensing and scrubbing apparatus, and especially so when the latter are not doing their proper work.

At this station the Pelouze & Audouin condenser proved to be the key for unlocking the problem of placing the works in a condition to perform the work effectively, and without adding other and more expensive apparatus; for, the tar once removed, the present condensers and scrubbers prove to be capable of finishing the treatment of such quantity of gas as the plant is required to produce.

Some Hard Facts in Regard to English Electric Lighting.

The technical literature of England certainly includes within its lists a great number of valuable publications, and amongst the most important of them may be ranked the weekly paper known as *Engineering*. Messrs. Maw and Dredge (its editors) have tried, as a general rule, to keep its teachings within the lines of safe conservatism; but it seems to us that these gentlemen in the especial case of the development of electric lighting, rather allowed their enthusiasm outstrip their carefulness when dealing in the past with the future early promise and prospects of their dazzling subject. Certain it is that *Engineering* made the greatest and loudest prophecies concerning the triumphs in store for the promoters of electric illumination, and actually at times grew positively hilarious (so intoxicating was the topic) over the speedy extinguishment of the art of gas manufacture. Certainly this mild and harmless sort of mental disturbance was not occasioned through any desire to behold the gas man "with his occupation gone;" but most likely had its inception in an ardent desire to behold the triumphant strides of a particular section of the army of "applied science." But *Engineering* has now some sad and strange admissions to make concerning the hollowness of its former promises, and as a sample of these we reproduce the following article (entitled "The Electric Lighting Companies") from its columns; and it is now rather amusing to contrast its doleful sentences with the confident utterances of a year or two ago. The writer says:

"Just two years ago the electric lighting companies were besieging the Board of Trade for provisional orders, and were dividing the country among themselves much as the Israelitish band under Joshua parceled out the promised land before they set foot in it. Every large town which was not defended by a too powerful municipality was awarded to one or other of the companies, while London, with its many centers, was more or less equitably divided among several of the principal. The process was not without its expense, but at a time when investments at 4 per cent. were most difficult to find, it was considered worth while to risk a good deal to obtain possession of a monopoly. And in spite of all sophistical disguises, the possession of a provisional order does confer a monopoly; it gives the holder the right to use the ratepayer's streets in which to lay his mains, and unless he flagrantly abuses his privileges, it defends his possessions against all competition. The very eagerness which companies displayed in obtaining these rights, and the alacrity with which they spent their slender stock of cash for the purpose, showed the great value that was attached to them by the applicants. And yet, after two years, there has been nothing effected, except the erection of an insignificant installation at Colchester. The schemes all ended in wind and nothing more, for the walls of the modern Jericho do not fall before the blasts of rams'-horns, however energetically they may be blown. The struggle for existence which besets the early years of every new movement cannot be carried on energetically without ample resources, and those which were at one time fairly abundant, had been foolishly squandered in the case of the electric light. Millons had been obtained and divided between sanguine inventors and astute promoters, and when the time for action came it found the companies without capital, and the public without confidence, and nothing could be done.

"After a long pause the electric lighting interests are again bestirring themselves, and, as we mentioned last week, they have had an interview with Mr. Chamberlain to try and get from him a modification of the conditions under which district lighting must be carried out. As matters now stand, the municipal authorities have the option of buying the entire plant and business of a district lighting company at the end of twenty-one years, or at the end of any succeeding term of seven years, at its net valuation, free of all compensation for goodwill, compulsory purchase, and the like. The companies argue, with great show of justice, that this entirely ties their hands, that the public will not risk their money upon such terms, and that a most promising industry is thus being strangled by Act of Parliament. In their interview with the President of the Board of Trade they met with as favorable a reception as they had any reason to expect. Mr. Chamberlain was firm on the point that no enduring monopoly should be created, but in other respects he showed a conciliatory attitude. He said 'He would admit at once that if they were to discuss the methods, they were fairly open to reconsideration. He should say that in the 27th clause the object of the committee was that, while the community should be enabled to resume this monopoly at any moment after the twenty-one years, it should do so on terms which would, at all events, fairly recoup the undertakers for all legitimate outlay. It might be that the terms of that clause did not carry out that object, and if the deputation were of that opinion, he could only say that if they would draw up such a modification of the clause as in their opinion would satisfy those conditions, he would take care that it had the fullest consideration. But he was bound to say frankly that he could not give any support whatever to a plain proposal that the whole of that clause should be repealed. He did not think the local authorities of the country would assent to any proposition of that kind, and he could not think that Parliament, which had shown itself hostile to the creation of those great monopolies, would allow a new one in the case of electric lighting unguarded by any such limitations as those which they had sought to impose. Some kind of limitation they must take to be an absolute necessity, and the only question to consider was whether the limitation proposed was a limitation which unfairly restricted the progress of the industry, and which, therefore, might be probably altered as to its details.'

"It thus remains for the companies to make a proposition that will be fair both for them and the public. They have reason to be thankful for the delay which the Act has imposed upon them, for if their hands had not been tied the financing of patent rights would long ago have been succeeded by the financing of provisional orders, and the stigma attached to electric lighting shares would, if possible, have been deepened. Many of the companies have seemed to think that the public might be eventually induced to come to their aid under the existing arrangement, and so they have asked for extension of time and kept the orders alive as long as possible. Now that this has come to an end they attribute their non-success to the influence of legislation. We very much doubt, however, whether they have yet struck the chief reason. Money in plenty would be forthcoming if only the public could be assured that scientists and engineers were agreed as to the practicability of establishing on a sound basis some of the systems which have been introduced during the last two or three years, whereas it is an open secret amongst investors that great differences of opinion exist, and that experts who have most fully considered the matter are convinced of the utter impossibility of making any one of the present schemes a success, either commercially or otherwise.

"The electric light companies are in far too great a hurry to bring their wares to market, and seek to organize great schemes when they have never tried small ones. It is difficult to point to more than very few installations of 1,000 lights, and yet they complain that circumstances will not permit them to fling themselves headlong into projects requiring 100,000 lights. It is to be hoped that Mr. Chamberlain will not accede to any alteration of the 27th clause that will open the doors to another rush of speculation. It may be that the infant industry is badly repressed, but the early precocity which it displayed quite justifies strong measures. The community can live happily for another five years without district lighting, and at the end of that time there will be a great store of experience accumulated to work upon. The demands of private users will have caused the construction of dynamos of large size, and the elaboration of a system of canalization, which will serve as the basis for a wider distribution. By that time, also, the cost of the electric light will be settled definitely, and perhaps, also, it may have been reduced. As long as it is double the price of gas, as at present, it can only be the luxury of the rich.

"The deputation called Mr. Chamberlain's attention to two other of their grievances; the first being that they are obliged to lay mains all over their districts, and to supply all who ask; and the second, that they must charge solely by meter. Both these might well be modified for a term at least. The difficulty of earning a profit will, on the most favorable assumptions, be sufficiently great without the unnecessary expense of laying mains in all the back streets, and as for the meter, such a thing does not exist, and therefore some other methods of arriving at a fair price must be devised."

Exhausters at the New Manchester (England) Gas Works.

The London *Journal* contains the following descriptive particulars regarding the exhausters constructed by Messrs. Gwynne & Co., of London, for the new gas works of the Manchester Corporation, located at Bradford Road. The description details that the four exhausters are placed in a building 34 ft. 6 in. wide, one pair on either side. The main inlet pipe from the condenser enters the building at the middle of one end, and is 30 inches in diameter. It is divided into two pipes (which pass round two sides of the house), and subdivided into four inlet pipes, 15 inches in diameter, to the exhausters. The outlet pipes are of corresponding dimensions, and between the main inlet and outlet pipes there is the usual self-acting by-pass valve, by which a direct communication is automatically made from the inlet to the outlet by the gas, in the event of any stoppage of all the exhausters, thus

allowing the gas to go forward. There is also a compensating by-pass valve, consisting of a gasholder float, from which is suspended a parabolic valve. The inside of the float is in communication with the inlet pipe, so that if the vacuum in this pipe and in the retorts should become excessive, the pressure of the atmosphere on the float forces it down, opening the valve so as to permit some of the gas to return from the outlet to the inlet. The valve is 8 inches in diameter, the float 27 inches in diameter, and it is loaded with weights, which can be adjusted according to the pressure in the outlet mains. Each exhauster is fitted with a valve on both the outlet and the inlet, so that any one of them can be isolated and the gas entirely shut off on both sides, in the event of repairs being required to it.

The exhausters are 3 ft. 4 in. diameter, and 3 ft. 2 in. long inside the main cylinder, and are each capable of passing 100,000 cubic feet of gas per hour at the slow speed of 70 revolutions per minute. The slides or pistons are made to overlap each other, and are of equal size, so that the centrifugal force of one of them acting in one direction is counteracted by that of the other acting in a diametrically opposite direction, in order to obtain the utmost steadiness in the exhauster when at work. The outer ends of the slides are bored through the greater part of their length parallel with the axis of the machine, so as to give a very large area of wearing surface to the pins, which fit in the holes thus bored, and by which the slides are connected with the segments. The segments are large frames of malleable cast iron, of a light but strong pattern, which are caused to travel round deep circular channels in the end plates of the exhauster cylinder. These channels are concentric with the cylinder, and therefore the segments which move in them guide the ends of the slides so that they are always kept in close contact with the inner surface of the cylinder. An extra supply of oil pumps is fitted on these exhausters, in order that the friction and wear of the sliding surfaces may be reduced as much as possible.

The exhausters are intended to work under a pressure of gas in the outlet pipes equal to a column of water 28 inches high, or 1 lb. per square inch. Both the exhausters and engines have been constructed with great care, and are of the best and most accurate workmanship. Messrs. Gwynne consider this an absolute necessity in making exhausters; and when it is remembered that, under the above-named pressure, an opening of only one square inch in area would allow 12,000 cubic feet of gas to leak back per hour, it will be evident that bad fits and inaccurate work are quite inadmissible. The crank-shafts of the engines are coupled to the ends of the exhauster-axles, on the principle of the universal joint, and carry heavy flywheels and the eccentrics which work the slide-valves. The eccentrics are provided with variable adjustment, so that the steam can be worked with the utmost rate of expansion which may be found desirable. Economy in coke for raising steam can be thus secured; and although it may be plentiful in gas works, waste is not more laudable there than anywhere else.

The steam cylinder for each pair of exhausters is 20 inches in diameter and 15 inches stroke. All the working parts of the engines and crank-shafts are of steel, and the slide-blocks of the crossheads are gun metal. The engines are fitted with lubricating apparatus, so that they can be oiled while they are in motion; and no stoppage need be made for this purpose. The steam and exhaust pipes are under the floor of the exhauster-house, and each engine is fitted with a separate steam stop-valve and a throttle-valve. The latter is actuated by a float governor, so that the speed of the engine is regulated by the vacuum in the inlet pipe, the valve being made to close by a fall of the float when the vacuum increases in the inlet, and to open by the reverse action.

We may add that the exhausters—which were made to the specification of Mr. John West, C. E., the late Gas Engineer of the Corporation, and have been completed for some time waiting until the Gas Committee decided that the Bradford Road Works should commence operations—are constructed on Mr. Gwynne's system to prevent oscillation in the gauge, with the view of obviating the deposit of carbon in the retorts by a regular and steady outflow of the gas. This plan has been adopted at Linacre, near Liverpool, as well as at Sheffield, Edinburgh, Kidderminster, Salford, etc., and there is no reason to doubt that this machinery will render good service to the Manchester Corporation.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

Something from Houston, Texas.—Mr. T. F. White, the guiding spirit in the management of the Houston (Texas) Gas Light Company, has been a rather busy man of late; but he has now the satisfaction of knowing that his company is placed in a position whereby all the demands that consumers make upon it during the winter season can be readily and certainly complied with. One of the principal objects sought for was the extension of conduit facilities, and the company has recently completed the following additions thereto: The first section of new mains laid footed up to a total length of 6,000 feet, the sizes grading from 16 inches in the largest diameter down to 4 inches in the smallest; the second section embraced the placing of 5,000 feet of six and four inch. The company's distribution facilities now extend to a point on the north side of Preston street, directly opposite the machine shops of the Houston and Texas Central Railway. Mr. White, however, was not content with "putting his house in order;" and, as an earnest of his intention to give the Houston gas consumer a share in the prosperity of the company, issued a business-like notice to them, on date of November first. The notice conveyed the pleasing information that from and after the time of its publication the rate charged for gas supplied would be reduced by fifty cents per thousand cubic feet. In accordance with the new schedule Houston consumers burning 5,000 cubic feet or over monthly obtain their supply at a figure of $3 per 1,000, and consumers of less than 5,000 pay $3.50. At first glance these figures might seem pretty high, but a little consideration of the subject will dissipate such belief. All the coal product carbonized at the Houston works comes from Westmoreland County, Pa. (Scott's Ocean Mine coal, we think, is the particular description), and this, of course, means heavy freight charges. The usual route for such shipments to travel over would be by rail from the mines to Baltimore, thence by vessel to Galveston, cargo being thence transhipped from that point on barges to Houston—in all, a distance of about 2,400 miles. The Texas prospector should bestir himself in the endeavor to "find" the right quality of black diamonds within the borders of the State. When Texas joins in the movement for reduction in gas prices, the fraternity can understand how widespread is the desire to do the "proper" thing. We congratulate Mr. White and his associates on the soundness of their policy.

Advertising Does Pay.—To show the truth of the assertion that advertising pays we make the following extract from the letter of a gentleman whose business has been regularly advertised in the columns of the Journal for some time back: "In handing you my check in settlement of bill for advertising, I would make my acknowledgments to the Journal for a very substantial increase in my trade, largely due to advertisement inserted in its columns—having filled over 90 separate orders from gas light companies during this year as against 60 filled in the previous twelvemonth." There is a good, plain, matter-of-fact statement.

Waking up the People of a City from Rather an Odd Cause.—A sleepy gas works employee is responsible for having disturbed the midnight repose of the inhabitants of the city of Utica, N. Y., on date of Sunday, Nov. 23d. When the hour of midnight is reached the pressure is reduced to the minimum point, and it is supposed to be one man's particular duty to attend to the operation. When Saturday, the 22d, had its death knell tolled by the town clock, the valve-man, as was his usual custom, adjusted the apparatus, as he supposed, to the proper position; but, owing presumably to his drowsy condition, he overdid the thing, and failed to notice the resulting condition of affairs. The pressure was cut down to so fine a point that the lower portion of the city was left in total darkness. A watchman in the benighted district speedily conveyed word to Superintendent Fish, and a hurried visit to the works soon revealed what occasioned the eclipse. Before 1 o'clock A.M. the pressure conditions were righted, but there still remained the dangerous circumstance that the flow from many night lights in sleeping apartments (extinguished from insufficiency of pressure) was passing off unconsumed. To remedy this state of affairs Mr. Fish secured the services of about thirty men and boys, instructing the hastily gathered brigade to scatter themselves over the affected district, and spare no means of arousing the sleepers to a sense of the threatened danger. Not entirely satisfied with despatching the "awaking army," Mr. Fish caused the city bell towers to ring a fire alarm, and the night watchmen in the business quarters of the place assisted in rousing the clerks and porters. The work was done so thoroughly that not a single case was afterwards reported where any of the inhabitants had suffered from the effects of gas inhalation; but we opine there must have been a vast amount of grumbling indulged in by numerous citizens of the place so long celebrated for its quaint and classic quietness, and not the less widely known as the home of Roscoe Conkling.

Fireproof Curtains for Theater Stages.—We find it stated that the management of the Philadelphia (Pa.) Academy of Music have been inquiring into the merits claimed for the asbestos drop curtains, their use and employment being designed as a means of preventing a fire originating on the stage from spreading to the auditorium. So well were they pleased with their investigations that they have decided to make a practical trial of the material, and have ordered the Chalmers-Spence Company, of New York city, to furnish them with a complete outfit. The curtain material is made up in the proportion of two-thirds asbestos to one-third cotton, and its thickness approximates closely to that of a good quality of Wilton carpet. In case of emergency the lowering of the curtain it is said will place a perfect barrier between the stage and audience, as the sides of stage will also be thoroughly protected by a covering of asbestos "boards," lined with wire cloth. This would seem to be a feasible plan, and anything designed to

make more secure from possible danger the positions of those in attendance at a theatrical representation should be at once brought into service.

INCREASING THEIR CAPACITY.—The Westinghouse Machine Company, of Pittsburgh, Pa., were recently obliged to shut down for a month in order to instal new tools, enlarge the foundry, and complete a new erecting shop and store-room. A new start was made on December 1st, with a capacity of 100 engines per month.

REDUCING PRICE OF GAS AT YORK, PA.—Mr. Jacob L. Kuehn, Secretary and Superintendent of the York (Pa.) Gas Light Company, writes us, under date of November 30th, that his company reduced the selling rates of gas from $2.25 per thousand to $2 to small users, and $1.90 to large consumers, the reduction to take effect on all consumption registered from date of Nov. 1st. Mr. Kuehn believes in securing himself.

A BOGUS METER INSPECTOR.—A fellow calling himself James Williams, and claiming 300 Bowery, New York city, as his residence, stood on a recent occasion before the presiding justice at Jefferson Market Police Court, and was called upon to explain what reason he could give for claiming to be a meter inspector when he was not on any city company's pay roll; but there was something else that the bold Williams found himself confronted with, and that something was to account for the disappearance (from the residence of Mr. F. C. Witherbee, No. 26 West 16th street) of an exceedingly valuable clock. The clock vanished just after the time Williams was supposed to have taken the "state of the meter." He could not make the matter clear, and accordingly was remanded. These cases have gotten to be quite frequent in the city, and it is only about six weeks ago that the Harlem Company was obliged to resort to the daily newspaper to advertise the fact that bogus inspectors and collectors were operating in its district. The Consolidated Company should lose no time in having such employes uniformed. The practice has worked admirably in Philadelphia, Pa., where the Gas Trust people instituted the reform some time ago.

A MEDAL AWARDED.—The managers of the A. S. Cameron Steam Pump Company, of New York city, have just received notice that a diploma and medal of highest award had been granted by the judges of merit at the Louisville (Ky.) Industrial Exhibition. The Cameron steam pump, during a history covering a period of a quarter of a century, has been thus honored with awards averaging more than one for every year of its manufacture.

GAS TRUST PECULATIONS.—A special despatch from Philadelphia (Pa.), dated December 1st, says that a report will soon be submitted in reference to the peculations of ex-clerks of the Gas Trust. It is stated that for eighteen months experts have been examining the books in the effort to discover the sum of the defalcations, which are said to reach nearly to $300,000. If this state of affairs be true the Trust had better at once turn its attention to the institution of more remedial measures. Having made a success of uniforming its outdoor employes, it may possibly be expected that it will be just as apt at reforming its accountants.

ELECTRIC LIGHT FOR TRENTON'S (N. J.) STREETS.—Some two years ago the People's Electric Light Company of Trenton was organized for the avowed object of keeping Trenton abreast with the times in the matter of street lighting. Now, Trenton needed something to keep it "abreast with the times" in that particular regard, for its municipal wiseacres appear to have hitherto had a great and positive fondness for illuminating its street corners with foul-smelling gasoline lamps. They could get gas, but they would not pay for it; hence the "modern" gasoline system was followed. The electric lighting project, however, appeared to slumber; but at last the People's concern emerged from its dormant state and blossomed forth under the title of the "Mercer and Burlington Electric Light Company." It is understood that Trenton is to have its dream realized; and even now it may be basking in the glorious reality. We do not know what price has been allowed for each light, nor the hours fixed upon for the lighting service; and while we are averse to figuring on what the future may bring forth, we will venture upon the prediction that Trenton's Council and Trenton's taxpayers will repudiate the system before 1885 shall have ended. Further than this, the "light of the future" will but pave the way to a return to a proper system of gas illumination; and if this result be reached, the inhabitants of Trenton can thank the introduction of electricity for having rid their streets of an abominable nuisance through causing the banishment of the sputtering gasoline lantern—although their thanks may possibly be somewhat lessened in fervor by a consideration of the fact that the experience gained came at a pretty high figure when they were engaged in paying the electric lighting bills.

MORE GOOD MONEY THROWN AWAY.—A company has been started to operate an electric lighting plant at Harrisburg, Pa. Capital stock of concern is placed at $100,000; and the prime movers in the matter are endeavoring to place the shares. Harrisburgers had better keep their names off the subscription lists.

LIBELING THE TAMMANY SOCIETY.—The Tammany Society of New York city, together with its present guiding spirit, Mr. John Kelly, has had to put up with a good many "hard knocks" of late. Now, whether the aforesaid "hard knocks" have or have not been properly applied is no part of our province to consider; but the following statement, given out as perfectly truthful by a sober English paper called the *Statist*, concerning the manner in which the Edison Company obtained permission to open the streets in the downtown district of New York city for the installation of its conduit system, is a little too spicy to pass by unnoticed. The article in the *Statist* is devoted to a description of the New York city incandescent lighting station of the Edison Company, its plan of operation, etc., and is, in the main, fairly correct in the details given. In due course the writer of the article explains how the Edison Company obtained the necessary consent to open the streets, and he does it in this manner:

"The necessary permission to open the streets to lay the electric mains was obtained, not by Act of Congress (!) or by other legislative or official means, but by the simpler and perhaps less costly method *of a payment to Tammany*. The sum which passed amounted to about £10,000; and in exchange for this payment the Edison Company is free to tear about the streets whenever it pleases to do so for electric lighting purposes."

Of course it is needless to add for the better information of our Yankee brethren that the Tammany Society has, of itself, no more control over the question of saying who shall or shall not disturb the streets of New York city than has Her Majesty Queen Victoria; but it might be just as well to here state the fact, in the hope that the *Statist's* knowledge of the status of the thing may be thereby somewhat improved. Just think of Mr. Edison, or imagine how it would look to see Messrs. Drexel, Morgan & Co. (the financial backers of the Edison Company), engaged in the operation of handing Tammany (represented, for instance, on the particular occasion by Grand Sachem John Kelly in person), a check for $50,000, and praying that it might be accepted as a convincing reason why permission should be granted them to open the streets! Truly, "'ere is richness, you know.."

PHILADELPHIA, PA., PREFERS GAS OVER ELECTRICITY FOR LIGHTING THE PUBLIC SQUARES.—Brother Stein, the popular heavy-weight Treasurer of the Siemens Regenerative Gas Lamp Company, is very much elated, and with sufficient reason, over certain results recently achieved by him in the "City of Brotherly Love." Brother Stein concluded that he would make an attempt to enter into competition with the electric lighting promoters, and accordingly made certain propositions to the proper authorities with a view to installing high-power Siemens burners as a means of illuminating Rittenhouse Square. The subject-matter of the propositions was referred to a subcommittee of the Committee on Distribution of the Gas Trust, acting in conjunction with the City Property Committee of Board of Councils. When the plans submitted had been thoroughly discussed, it was decided to adopt the proposition of the Siemens Company, and its representatives were authorized to erect 24 of their 500-candle power burners and lanterns, at points to be designated by the Committee, along Rittenhouse Square. The authorities have also refused to renew the contracts (now about to expire) for lighting certain other squares with electricity. Another important point scored by the energetic Stein is the securing of a contract to light the City Council Chambers with the Siemens burners. The electrical purveyors were especially desirous of securing this award, but Stein was too much for them. The Philadelphia *Public Ledger* (and it is one of the most important papers in the United States), when the subject of employing improved methods of gas lighting for illuminating Rittenhouse Square was first broached, editorially commented upon the proposition in the following manner: "There is a strong disposition to use the Siemens gas burners instead of electric lights in the public squares, and with good reason. As a light the Siemens gas jet fairly rivals the electric in brilliancy, is superior to it in steadiness, and appears to be considerably cheaper. It has the advantage, moreover, that it can be introduced wherever there are gas mains, without disturbing the streets or stringing up wires overhead. The arc lights have served a good purpose in compelling improvements in the methods of burning gas, and they have a formidable rival in the Siemens burners." Almost everybody now can see the truth of what the London *Journal* and ourselves claimed at the first outset of public electric lighting—that the introduction of electricity was sure to ultimately prove of important benefit to the gas manufacturer, since its advent could not fail to make the gas engineer more active in developing the latent power of his product as an illuminator; and, further, that the public, educated to the point of demanding "more light," would naturally, when the excessive cost of electricity over gas was made practically apparent, turn back to the gas purveyor when he had solved the problem (thanks to such of his brethren as Sugg, Bray, Siemens, and Grimston of the old country, and Lipsey in his own) of "how to burn gas." The

rest of the gas men can do in their sections just what Mr. Stein has done in Philadelphia. Their efforts may not at first meet with immediate success, because undoubtedly the recent International Exhibition of Electricity at Philadelphia, giving as it did the Siemens Company an opportunity to show what the Siemens burners could accomplish (when placed in direct comparison with the best systems of electric lighting) in the field of public illumination, had much to do with so speedily convincing the Philadelphia Councils that Mr. Stein's proposition was in the line of feasibility and economy. Notwithstanding this, the effort should be made in every place; and, if well directed, in the end must terminate successfully. Try the course, gentlemen of the fraternity; and be satisfied of your strengthened position as lighting purveyors of the present and future.

Something from Middletown, N. Y.—Mr. H. R. Wilcox, President of the Middletown (N. Y.) Gas Light Company, informs us that a man named Cole has been prospecting in his township with a view to establishing an incandescent lighting station for the supply of domestic illumination. The Middletown Gas Company has an existing contract with the authorities for street illumination, intended originally to cover a period of ten years from date of signing. This contract has some years yet to run, and so the gas folks have not much fear but that they are secured as to this feature of their business. Cole has been making the usual run of promises to secure rights, customers, etc., but does not appear to have met so far with any appreciable success. Among other things, he guarantees that the incandescent lights will secure an increased amount of light to the users thereof, and agrees, when the time of settling bills is reached, that a comparison with former gas bills will show a saving also in the matter of dollars and cents. He proposes to use the Edison system. It might here be added that the Middletown Gas Company's contract for lighting streets is based on a charge of $15 per lamp per annum, lamps to be lighted on 18 nights of each month. We hope Mr. Wilcox will post us in any new developments that may transpire in regard to Cole's movements.

New Use for Residual Products.—Mr. O. B. Monnett, Secretary of the Bucyrus (Ohio) Gas Company, writes us that he has just been allowed a patent on a "sheep wash" preparation, which the inventor asserts is made up entirely of a waste gas works product; but fails to tell what the residual is, although the information may come along in good time. Mr. Monnett claims that the material may be made a great source of profit in all countries where sheep raising is extensively followed. He says that the material costs producers but from 4 to 5 cents per gallon, and that it will readily sell for 30 cents. Now that Mr. Monnett has secured the patents, perhaps he may furnish our readers with a description of the material and the specific manner of its application.

Personal.—Mr. Benjamin Rankin, formerly attached to the engineering department of the Louisville (Ky.) Gas Light Company, is now engaged in the business of gas and steam fitting, in connection with a salesroom for gas stoves, gas engines, etc. His headquarters are located at No. 519 Fifth avenue, Louisville, Ky.

An Electric Light Wire Causes Havoc in N. Y. City.—About this time a year ago one or two more less severe accidents were occasioned in New York city through the falling of electric lighting wires, which happened in their descent to come in contact with naked telephone or telegraph wires, such contact, of course, causing many curious freaks. The circumstance then happening as it did at a time when the subject of the compulsory burying of all electrical wires was being discussed in the Legislature at Albany, afforded a rather powerful argument that was instantly made use of by the advocates of the scheme, and may possibly have been no inconsiderable means in influencing the final action of the Solons. Of course the electrical people pooh-poohed at the absurdity of such reasoning, saying that a similar accident was not liable to occur for years, etc. We must say that the past summer and fall seasons have not been marked by any great or striking accident of a like kind. Beyond a few cases of conflagration, traceable to the electric conduits, serenity marked the situation up to the date of the evening of December 8th. During the prevalence of a remarkably severe southeast storm, an electric lighting wire, at the point where it crossed Fiftieth street, at Third avenue, was forced from its fastenings, falling across one of the telephone wires of the Bell Company. These wires are used to transmit information between the various fire engine houses in that district. As the powerful current of electricity flashed along the circuit the delicate wires at every station were burned out, and the instruments in four of the engine houses were entirely destroyed. From 11 P.M., Saturday (Dec. 8), until early in the evening of following Monday (10th), engine houses Nos. 8, 16, 21, and hook and ladder company No. 2, were shut off from communication with one another, and also from headquarters. At engine house No. 16 the framework of box burst into flames, a like state of affairs resulting at house of hook and ladder No. 2. The Bell wire "crossed" was entirely devoted to the service of the fire department, but had it happened to have been a general commercial one communicating with business houses and private residences, the possibilities of danger would have been greatly augmented. And this is added not with any intention of detracting from the seriousness of the case above reported—for we certainly believe that our fire and police telegraphic communication should at all hazard be preserved from any sort of interruption. The officials at police headquarters say that these interruptions are more or less common, and that they have got used to them. It ought to form part of their duty to make public and prominent mention of every case of the kind that occurs.

Three Fatal Cases of Asphyxiation by Illuminating Gas in New York City.—There is one sort of official in New York city who can tell by certain and unmistakable evidence (even were it possible for him to be so physically constructed that his body would fail to respond to the sensations occasioned by low temperatures on the frame of mortals of the ordinary sort, or were he so blind as not to be able to read a thermometer), that winter is upon him. That wonderful official holds the office of coroner, and the convincing evidence is simply the decided increase in the number of fatal cases of asphyxiation from the inhalation of illuminating gas that are presented to his notice when the denizens of this great city close tightly up the windows and doors of their sleeping apartments in an effort to keep "Jack Frost" from intrusion. The batch of deaths to be recorded herewith foots up to the respectable number of three—quite sufficient for a fortnight's statement. The first in order is that of a man named M. L. Paul, who registered at the Sturtevant House, 1,186 Broadway, on date of Nov. 22d. Mr. Paul roomed at the Sturtevant steadily during the period between that time and Dec. 3, managing the gas burner all right until the night of December 3d; so it cannot be claimed he was ignorant on the subject of gas illumination. At three o'clock A.M., of December 4th, a watchman traced an odor of escaping gas to room 401 (Paul's apartment), and the inmate of the apartment was found lying dead on his bed. Dr. Mulford, who resides in the hotel, was called immediately; but the physician could do nothing, giving as his opinion, though, that the man had been dead but a short time. The victim had retired to bed at 11 P.M. Mr. Paul was 40 years of age, and was employed as a buyer by the well-known drygoods firm of D. McCarthy & Co., of Syracuse, N. Y. Verdict of coroner's jury was, "Case of accidental suffocation from the inhalation of illuminating gas." The second case is that of a young man named Francis Rosenbauer, of Albany, N. Y., who stopped over night at Leggett's Hotel, 44 Chatham street, New York city, on date of December 5th. Rosenbauer was on his way to fill a drug clerk's situation in the shop of a man named Ulmer, doing business in Jersey City, N. J., which situation he had just secured. He retired to bed at 10 P.M., giving instructions to be called early in the morning. The porter who went to awaken him on the next day found him dead in bed. The evidence taken at the inquest went to show that the burner pinion was broken, and so the gas was unwittingly turned on again. Another verdict similar to that given in the case of Paul was returned. The third case is that of a retired merchant (a widower aged 65) named John Deyo, who had boarded for quite a while in the house at No. 224 West 47th street. On the morning of December 6th, Deyo's prolonged absence from the breakfast table led to an investigation, which resulted in the discovery that he had been suffocated by the inhaling of illuminating gas. As in the case of Rosenbauer, the evidence went to show that the burner had no "safety-stop." Coroner's verdict was identical with that given in the former cases. There is no need to add what sort of gas caused the deaths—it is the story which has been so often repeated since Tessié du Motay and his process was first introduced to the public of our city mainly by the exertions of that moribund benefactor—Edward Stern.

War of Gas Rates at Louisville, Ky.—It is expected that the opposition company at Louisville, Ky., will begin sending out gas on Feb. 1st. The first step in warfare tactics was taken by the old Louisville Company which announced a reduction in rates to one dollar per thousand to take effect with first of new year. Particulars will be given in next issue.

Salt on the Pacific Coast.

One of our exchanges calls attention to the item that in the reduction of silver ores and other metallurgical operations on the Pacific coast, between 20,000 and 30,000 tons of salt are disposed of every year, besides which a vast quantity is used for meat and fish packing and such like purposes. It is, therefore, fortunate that of all the useful minerals found on this coast none are so widely distributed as salt. Besides numerous salt springs, ponds and lakes, this mineral exists in crystallized layers interstratified with other substances, the whole forming great mountain-like masses, and in deposits occupying the beds of dry or nearly dry lakes, on wide, extended marshes, alkali flats, etc. Large quantities of salt are also manufactured by solar evaporation, the long, rainless summer being specially advantageous for the operation. On the bay of San Francisco alone 50,000,000 tons are produced in this way every year. The plan of producing salt by boiling in kettles or evaporating the brine by artificial heat is not practiced here. In the vicinity of Alvarado the evaporating reservoirs cover hundreds of acres.

THE AMERICAN GAS LIGHT JOURNAL

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TUESDAY, DECEMBER 16, 1884.

The Market for Gas Securities.

The New York city gas share market ruled at fairly steady prices during the fortnight, although the tone of speculation is rather weak. Of course there must be some exception to a general evenness in the financial aspect, and this time the exception is furnished by the New York Company's shares, this stock having advanced eight points in bid price. One or two brokers are offering Consolidated shares at 85, and it is rather surprising that at this figure only a few transactions have taken place—offerings being yet freely made at the 85 notch, but purchasers are decidedly shy. We would advise investors to seize the opportunity while it presents itself, as in our opinion Consolidated stock should readily command from 95 to par. Equitable shares are weaker, there being no especially exciting cause for such decline. The Company, during the past week, was engaged in "blowing out" the distributing mains, and may be looked to on any date to commence sending out to consumers. Quite a lot of shares were sold at auction during the two weeks, of which the following list shows details: On Dec. 3d, 100 share Metropolitan, at 233½; 100 shares Harlem, at 116½; 220 shares Manhattan, at 270; 100 shares New York, at 159, and 50 shares at 158½; 30 shares Municipal, at 205. On Dec. 10th, 200 shares Manhattan, at 269 to 261; 100 shares Metropolitan, at 230; 103 shares Harlem, at 116½; 150 shares New York, at 160 to 158½. There were also disposed of on latter date $20,000 Williamsburgh (Brooklyn) gas bonds, at 107¼.

Brooklyn shares are somewhat firmer, as a comparison of quotations shows. The best purchase on the Brooklyn list appears to be Nassau, although the stock is rather firmly held, and any demand for it would probably result in a decided stiffening of price. Still, it appears worth at least 120, considering the fact that its maximum output this winter is sure to reach over one million cubic feet 24 hours on more than one occasion.

Out-of-town shares have attracted some attention, this being particularly noticeable in the case of Jersey City gas. It is understood that negotiations are in progress between representatives of the Jersey City and Peoples Companies and certain Philadelphia parties (supposed to be the managers of the United Gas and Improvement Company ring), these latter proposing to guarantee the Jersey City Company a 10 per cent. per annum dividend, allowing the Peoples Company 4 per cent., in consideration that the two last-named lease their plant, etc., to the Philadelphia pledgers. Judging from the past performances of the Quaker City "guaranteers," and looking at the position held by the old Jersey City Company, we think the present owners of the monument bearing witness to Mr. Geo. W. Edge's industry and sagacity had better keep on in the even tenor of their way. Washington (D. C.) gas is higher; and holders of Louisville (Ky.) stock need not be surprised at a decline, as President Baxter means to fight the Chess, Carley combination. This week we publish a quotation for Peoples, of Chicago. Consolidated, of Baltimore, declared a dividend of 4 per cent., payable December 15—a sort of Christmas present sadly missed by Baltimore shareholders of some time back.

Gas Stocks.

Quotations by Geo. W. Close, Broker and Dealer in Gas Stocks (with A. E. SCOTT & CO.,)
72 BROADWAY, NEW YORK CITY.
DEC. 16.

☞ All communications will receive particular attention.
☞ The following quotations are based on the par value of $100 per share.

	Capital.	Par.	Bid	Asked
Central	$440,000	50	60	—
" Scrip	220,000	—	47	57
Equitable	2,000,000	100	87	90
Harlem	2,000,000	50	115	120
" Bonds	170,000		—	—
Manhattan	4,000,000	50	260	270
Metropolitan	2,500,000	100	230	235
" Bonds	658,000	—	110	112
Mutual	3,500,000	100	118	122
" Bonds	1,500,000	1000	104	106
Municipal	3,000,000	100	205	210
" Bonds	750,000		107	110
New York	4,000,000	100	158	162
Northern	125,000	50	—	80
" Scrip	108,000			
Gas Co's of Brooklyn.				
Brooklyn	2,000,000	25	127	129
Citizens	1,200,000	20	88	90
" S. F. Bonds	320,000	1000	106	110
Fulton Municipal	3,000,000	100	152	155
" Bonds	300,000		104	108
Peoples	1,000,000	10	83	85
" Bonds	290,000	—	105	110
" "	250,000	—	90	95
Metropolitan	1,000,000	100	94	96
Nassau	1,000,000	25	115	118
" Ctfs	700,000	1000	88	90
Williamsburgh	1,000,000	50	139	141
" Bonds	1,000,000	—	106	108
Richmond Co., S. I.	300,000	50	64	75
" Bonds	40,000	—	—	—
Out of Town Gas Companies.				
Buffalo Mutual, N. Y.	750,000	100	80	85
" Bonds	200,000	1000	95	100
Citizens, Newark	918,000	50	103	115
" " Bonds.	124,000	—	105	110
Chicago Gas Co., Ills	5,000,0000	25	125	—
Peoples G. L. & C. Co., Chicago, Ills			8	12
Cincinnati G. & C. Co.			180	182
Consolidated, Balt.	6,000,000		84½	85x
" Bonds	3,600,000		112½	113
Central, S. F., Cal.			—	60
Capital, Sacramento, Cal.			55½	—
Hartford, Conn	750,000	25	124	130
Jersey City	750,000	20	135	140
Laclede, St. Louis, Mo.	1,600,000	100	88	—
Louisville, Ky.	1,500,000	50	96	100
Montreal, Canada	2,000,000	100	165	175
New Haven, Conn		25	166	170
Oakland, Cal.			29½	30
Peoples, Jersey City		—	—	75
" " Bonds			—	—
Paterson, N. J.		25	96	99
Rochester, N. Y.		50	75	80
Washington, D. C.	2,000,000	20	190	195
Wilmington, Del.		50	188	—
Yonkers		50	—	—
St. Louis, Missouri	600,000	50	340	—
San Francisco Gas Co. San Francisco, Cal.			62½	62¾

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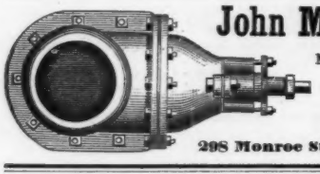

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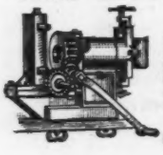

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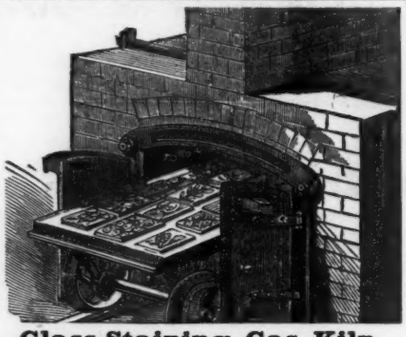

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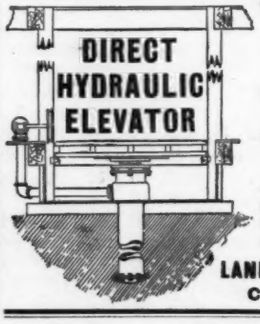

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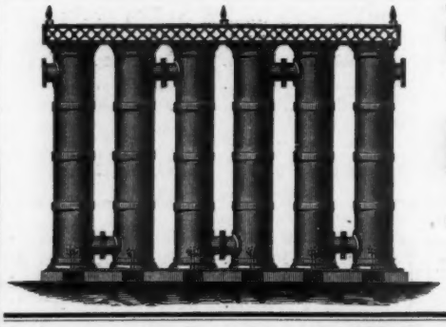

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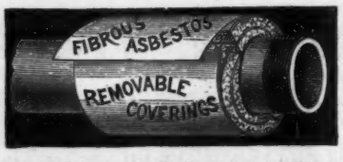

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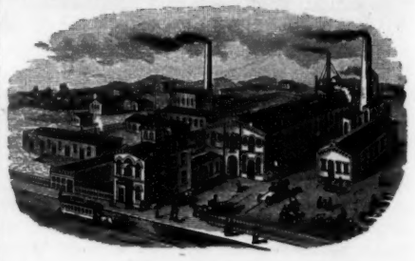

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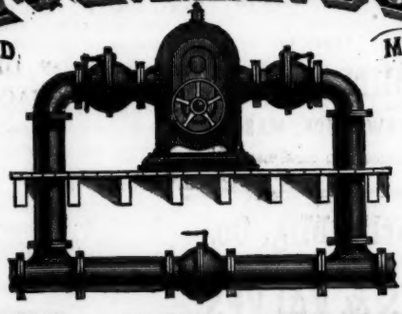

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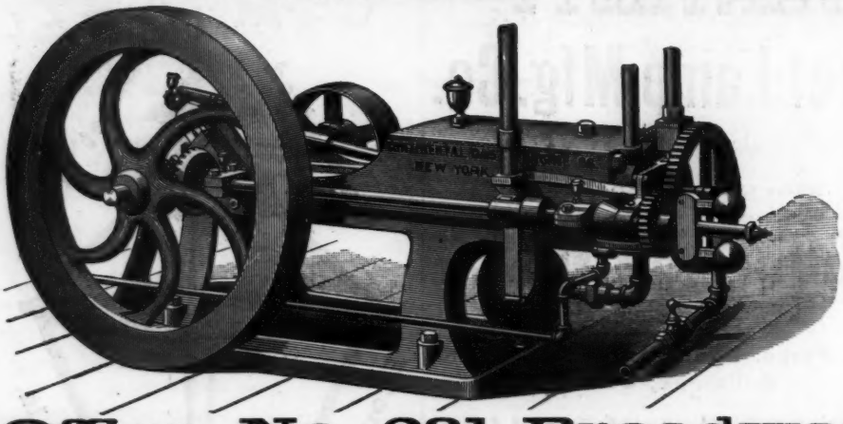

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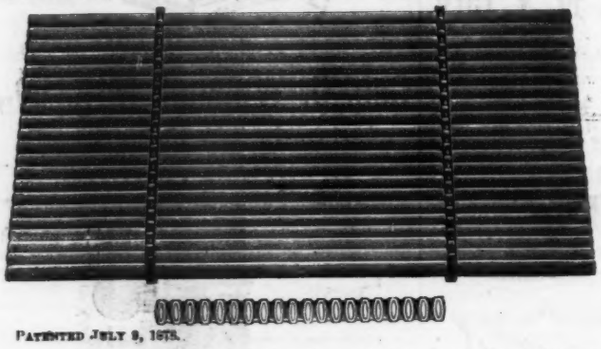

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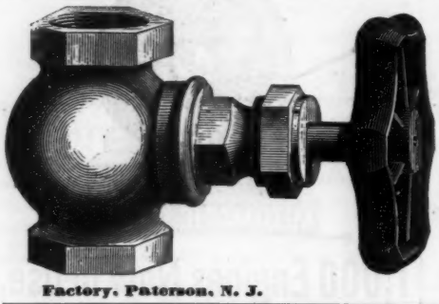

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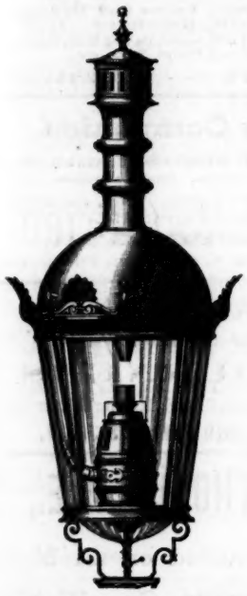

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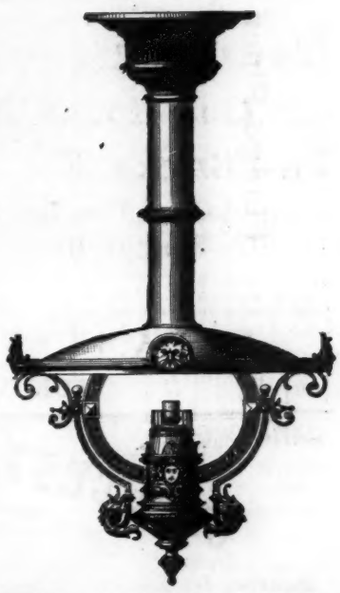

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1879	24,545,000	"
1880	42,967,500	"
1881	36,462,500	"
1882	39,800,000	"
1883	57,735,000	"
1884	26,177,500	"
Total	235,937,500	cubic feet.

Total Number and Capacity per 24 Hours of "Standard" Washers Erected and in Course of Erection in the Several Countries

	Number.	Cubic Feet per Day.
Great Britain	151	137,070,000
Western Hemisphere	38	39,337,500
Australia	18	12,150,000
New Zealand	2	650,000
France	6	4,550,000
Belgium	8	5,420,000
Germany	16	8,200,000
Holland	4	4,160,000
Denmark	1	150,000
Russia	2	3,500,000
Spain	1	350,000
India	1	400,000
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Bombay Gas Co	400,000
Brussels Co	1,250,000
Chemnitz Gas Co	1,000,000
CITIZENS GAS CO., BUFFALO	750,000
Coke Works in Zabre, Ober-Schlesien	1,500,000
Cokerei der Friedenshutte, Upper Silesia	500,000
Dumfries Corporation	250,000
Dunedin Gas Co., New Zealand	400,000
King's Lynn Gas Co	300,000
Leiden, Holland	600,000
Lincoln Gas Co	400,000
Liverpool Gas Co	2,000,000
" "	3,000,000
LOUISVILLE GAS CO.	1,500,000
Numea Gas Co	100,000
PITTSBURGH GAS CO	1,500,000
PORTLAND GAS CO., Oregon	562,500
SAN FRANCISCO GAS CO	4,000,000
Sheepbridge	40,000
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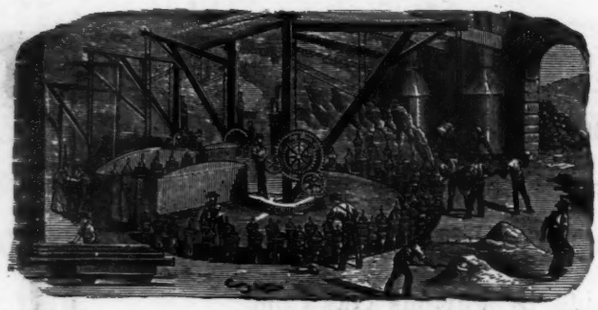

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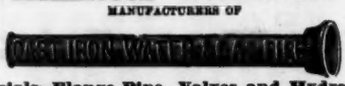

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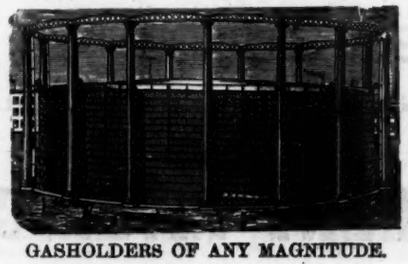

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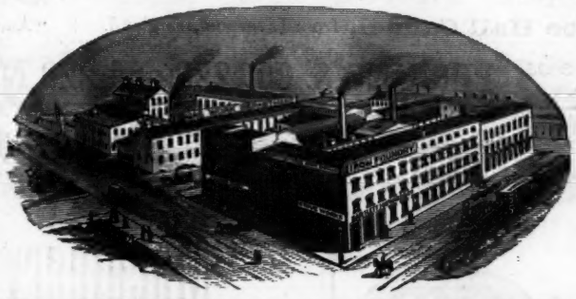

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Deseronto, Can.
Hoosic Falls, N. Y. (2d.)
Bethlehem, Pa.
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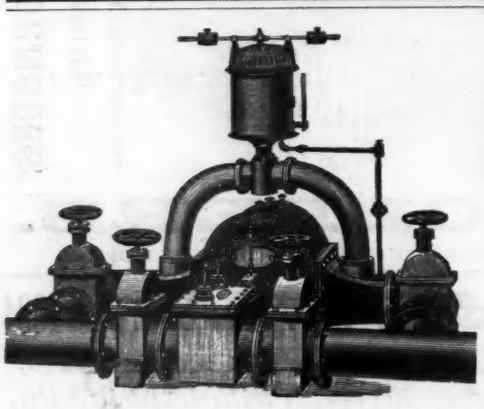

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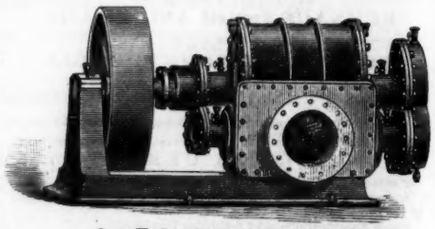

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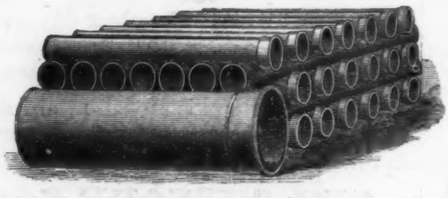

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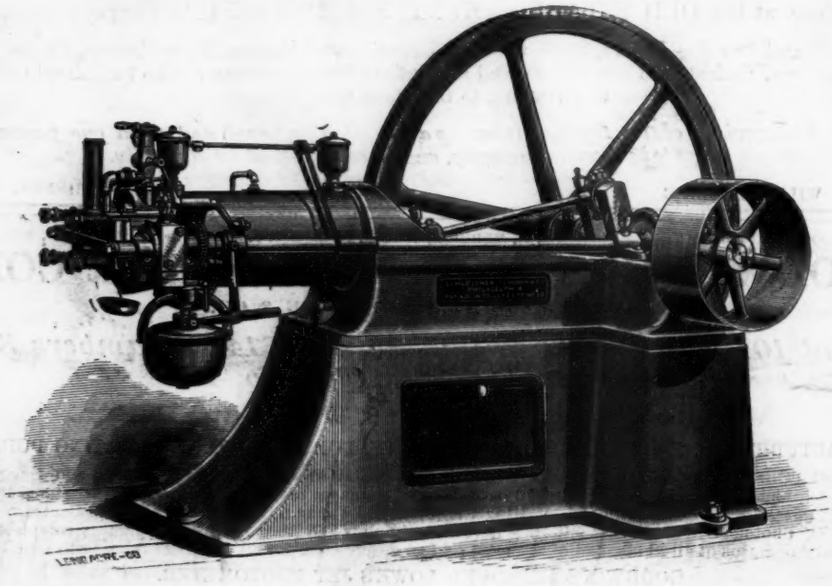

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